THE FOUNDRY

for JULY 1945

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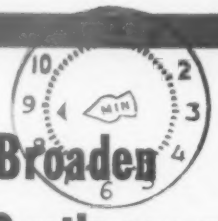

Research Can Broaden Markets for Castings

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AS INDUSTRY moves further toward reconversion, foundries probably have the finest opportunity in history to expand their markets. An awakened public realization of the essentiality of castings in constructing machines and munitions of war can be translated into an increase in the application of castings for peacetime engineering construction, providing the foundry industry is awake to its opportunity.

Because pouring into molds is the best and, in the vast majority of cases, the most economical method of forming metals, castings should enable many manufacturers to produce better products at reduced costs. Undoubtedly interest in various types of castings, in developments in production techniques, and in ways to reduce necessary machining, is growing constantly. An interesting example of how such developments may increase greatly the use of castings in postwar automobiles is reported by Art Allen on page 131. Further research should open up tremendous market potentialities.

And what is the foundry industry doing in the matter of research?

In all probability the total effort of all foundry organizations is quite large. If a review of the entire field were possible, it would be found that a great amount of fundamental and practical research constantly is in progress in plants and laboratories of individual foundries, among organized groups of foundries, in various independent research laboratories, among the manufacturers of foundry equipment and supplies, and in laboratories maintained and operated by the government. Another form of research is to be found in the committee work of technical and trade societies, where individual committee members undertake certain phases of a particular study in their respective plants and the results are correlated through combined committee effort.

Although the industry can be proud of the splendid work that has been accomplished, it seems apparent that present research programs dealing with production and application of castings are not sufficient to meet the needs of the majority of foundries or of the buyers and users of castings. Based on the value of castings produced, it can be argued effectively that not enough money is being spent on research, and that the present programs are being supported by too few companies. While many individual companies and groups maintaining research programs have been most generous in permitting results of much of their work to be made available to the entire field, greater benefits would accrue if active participation and financial interest could be spread over a greater segment of the foundry industry.

In order that the industry may become more familiar with some of the research work now under way, THE FOUNDRY is beginning a series of articles with this issue which will describe a number of research laboratories and projects specializing on foundry problems.

May these examples produce a realization of opportunities and a determination to provide more foundry research.

Frank G. Steinebach
Editor

FOUNDRY RESEARCH —

At the Naval Research L

This is the first of a series of articles describing some of the outstanding foundry laboratories of the country and their activities. These discussions seek to emphasize importance of the role which research has played and can continue to play in improving casting quality and foundry practice

EMPHASIS placed by private business on the importance of industrial research is matched, if not exceeded, by the attention given by the United States Navy to scientific study of all matters affecting the safety, reliability and efficiency of the Fleet. Naturally the Navy's research has been intensified as a result of the war, although the work in general is a continuous one, and in the case of foundry experimentation has proceeded for more than 15 years with highly beneficial and practical results for the foundry industry as a whole.

Congress authorized creation of the Naval Research Laboratory in 1916 on the recommendation of a naval consulting board. Interrupted by World War I, construction of buildings and commissioning of the Laboratory were delayed until 1923. The organization has grown steadily the past 22 years until today it occupies approximately 40 research and service buildings on a 50-acre plot at Anacostia Station on the outskirts of Washington, and has a staff of about 5000 civilians and navy personnel. Its director is Rear Admiral A. H. Van Keuren, who is well known for his furtherance of co-operation between government and private industry in research matters, and who recently was voted a life membership in the American Foundrymen's Association in recognition of his efforts in behalf of the foundry industry.

Fig. 1—Rear Admiral A. H. Van Keuren, director of Naval Research Laboratory, Anacostia Station, Washington

Fig. 2—General view of main bay of Steel Castings Section foundry. Part of the melting equipment is shown in foreground. Offices and laboratories are located on the ground and second floors to the right of this bay

Fig. 3—Exterior view of the Steel Castings Section building, one of approximately 40 research and service buildings devoted to the Navy's research activities

Fig. 4—Staff of the section includes 26 professional men and 15 floor men, all under the direction of Howard F. Taylor, principal metallurgist. Shown seated in the front row, left to right, are: Harold F. Bishop, Howard F. Taylor, Dr. F. M. Walters Jr., Robert E. Morey and Kenneth L. Clark. Dr. Walters is superintendent of the Division of Physical Metallurgy, which includes the Steel Castings Section

Studies Are Highly Diversified

Studies carried on by the Naval Research Laboratory necessarily are highly diversified, but among the most important are those under the direction of the Division of Physical Metallurgy, which began its work in 1927 and which currently is headed by Dr. F. M. Walters as superintendent. Aims of this division are two: First, to conduct research upon metallurgical problems assigned by the various naval bureaus and, second, to conduct purely scientific research upon metallurgical problems in order to build a fundamental scientific basis for metallurgical practice.

Work for the division is handled by six sections which are concerned with the following subjects: Steel castings, welding, nonferrous metals, special alloys, radiography and x-ray, and analytical chemistry. Foundry research is conducted by the Steel Castings Section, this having been the name given the section at its inception in 1929 when its principal task was the study of fundamental defects in steel castings and the development of methods for overcoming them. Charles W. Briggs and Roy A. Gezelius developed the research program at that time and are well known for their many and invaluable contributions to the technology of the steel foundry industry. However, while this remains the primary consideration, the work of the section has been broadened recently to include research on gray iron as well, and part of its activities are carried on in co-operation with the Nonferrous Section.

Some of the foundry work is directed toward the solution of specific problems which occur in Navy Yard foundries or in commercial foundries making castings for the Navy. For example, an exhaustive study has been made of the causes of and methods for preventing *bore cracks*, which are circumferential

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By WILLIAM G. GUDE
Associate Editor
THE FOUNDRY

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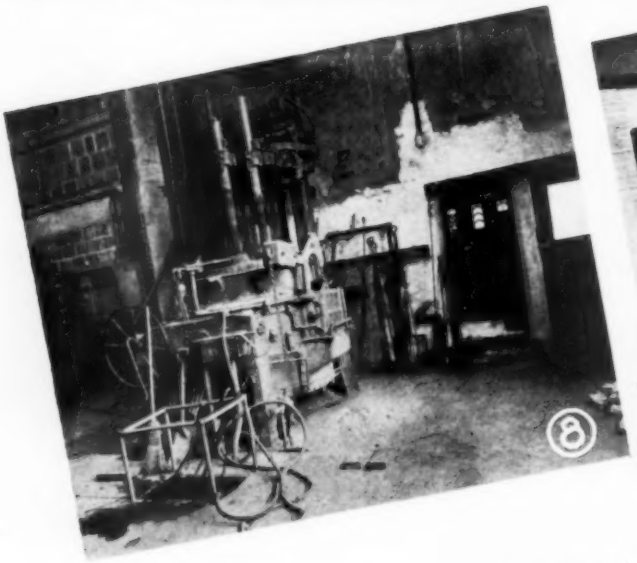
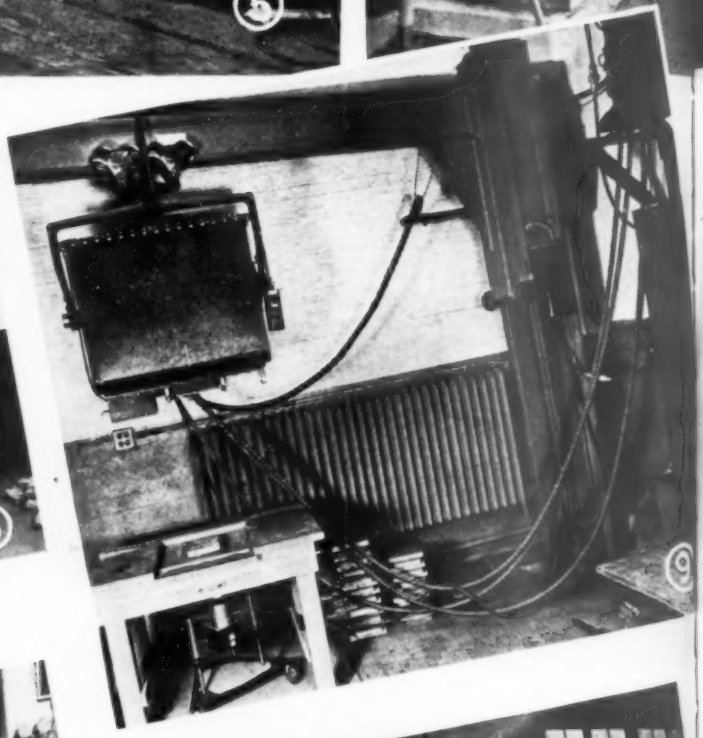




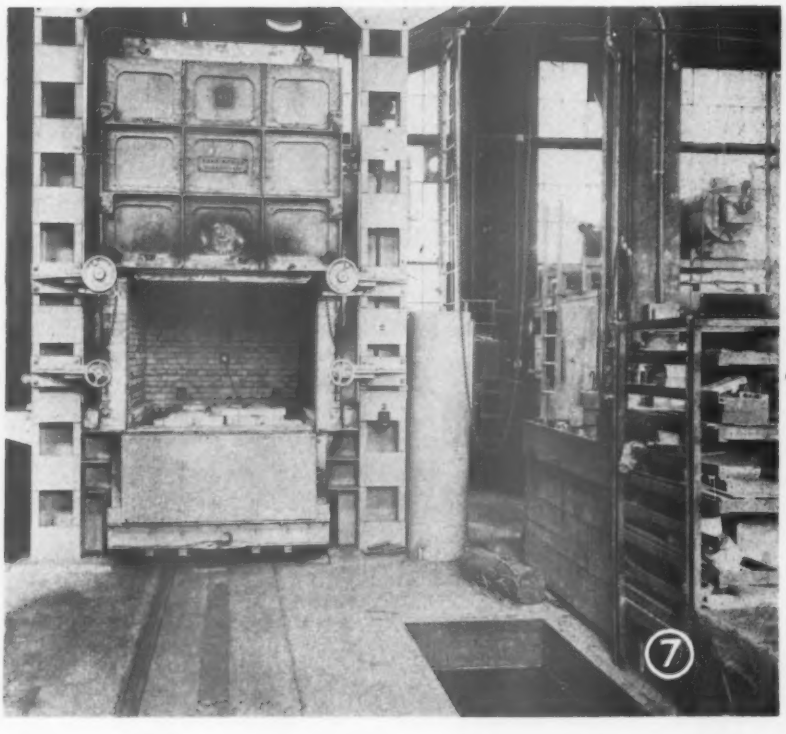


Fig. 5—Some of the foundry's melting furnaces. This equipment includes electric units and gas and coke fired crucible furnaces

Fig. 6—Sand research laboratory is provided with modern equipment of various types. Sand studies comprise an important part of the section's work

Fig. 7—Car type furnace for heat treating castings. Quenching pit is located under the floor

Fig. 8—Electric arc furnace of 1000 pounds capacity, shortly to be replaced by modern 2000-pound unit

Fig. 9—X-ray room, located just off the foundry floor. Adjacent to it is a dark-room for preparing radiographs

Fig. 10—Some of the equipment used in production of precision castings, in certain instances on a small scale production basis

Fig. 11—Forging department. The 500-pound-capacity hammer is set on a spring-supported block to minimize vibration

hot-tears occurring directly under the flanges of cast steel valve bodies and fittings for high-pressure steam lines. By eliminating stresses arising from lack of collapsibility of the core, and application of proper gating and risering, a solution to the problem has been found which is reported to have been successful in commercial practice. Information developed in the study also is expected to aid in the general investigation of hot tears, which are a problem in any casting.

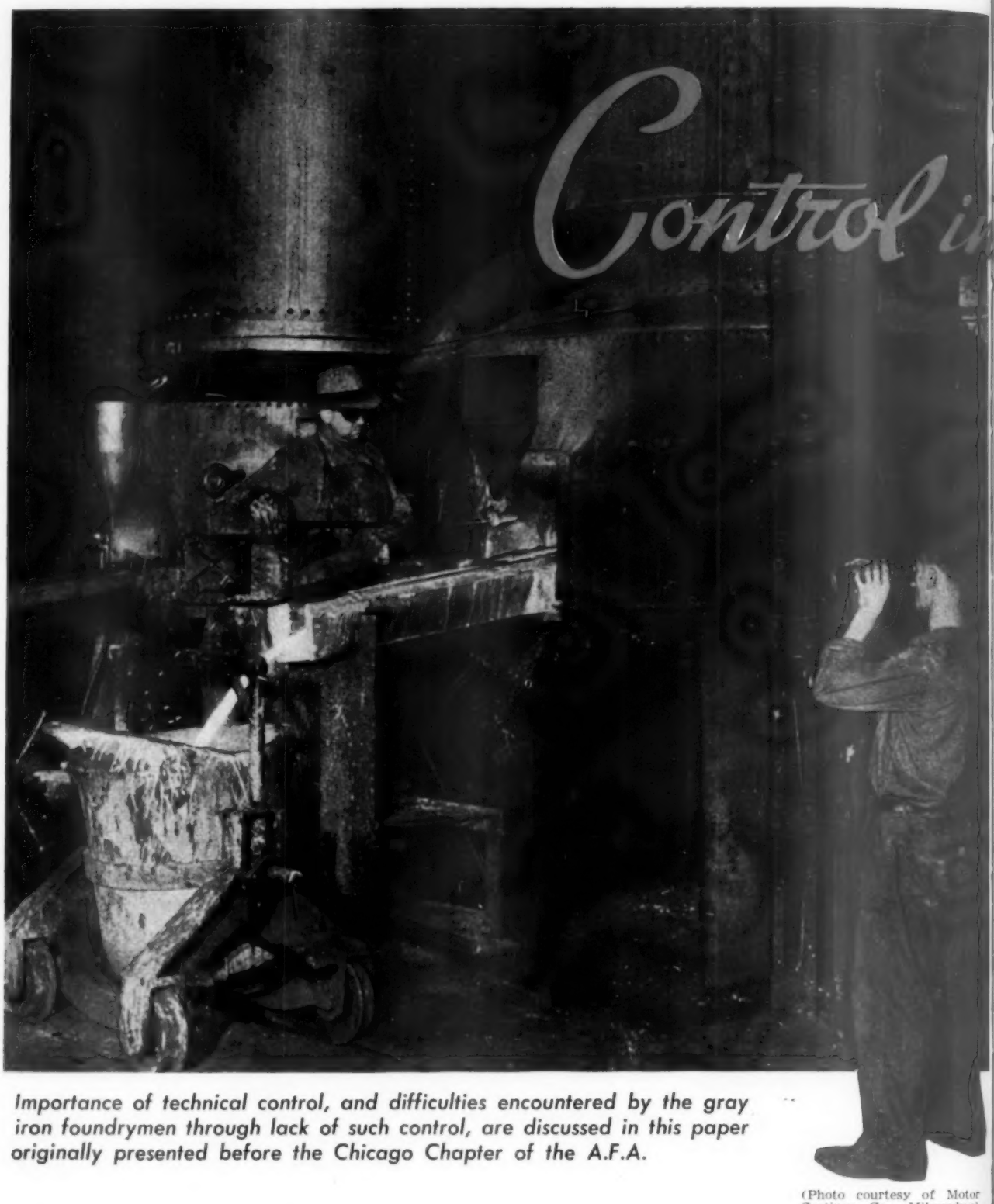
Certain other work of the section has for its objective the solution of fundamental problems in foundry practice, and results of such basic studies are made freely available to industry. There is nothing altruistic in this latter procedure; the Navy takes the far-sighted attitude that since it buys more castings from industry than it produces in its own foundries, it stands to benefit from improved methods adopted by industry as a result of its research activities.

In addition to studies on foundry methods, foundry materials, such as cereal and oil binders, are investigated for the Navy Department to determine what properties, and within what range those properties, should be specified to insure that Navy foundries economically obtain quality materials.

Facilities of the Steel Castings Section serve the dual purpose of a laboratory for the section and a shop foundry for the entire Naval Research Laboratory, furnishing castings required in the building of specialized equipment for research in the fields of radio, sound, mechanics, etc. This makes possible research under conditions somewhat analogous to regular shop practice and allows the results of research to be immediately applied as a check on their probable plant value.

A staff of 26 professional men and 15 floor men, all under the direction of Howard F. Taylor, principal metallurgist, carries on the work of the section in the well arranged and modernly equipped foundry. The building, measuring 60 x 160 feet, incorporates facilities for conducting practically all of the operations required in general foundry practice, one exception being pattern-making, which is done in a separate department in the carpenter shop.

The foundry is equipped with four jib cranes and two 7½-ton traveling cranes. Melting equipment, located principally at one end of the building, comprises a variety of types and sizes of furnaces. Electric units range in size from a lift-coil high frequency furnace taking a No. 70 pot to a 1000-pound capacity arc furnace, and include 100 and 300-pound tilting induction furnaces. Also available are two small gas and coke (*Please turn to Page* 167)



Control in

Importance of technical control, and difficulties encountered by the gray iron foundrymen through lack of such control, are discussed in this paper originally presented before the Chicago Chapter of the A.F.A.

(Photo courtesy of Motor Castings Co., Milwaukee)

THE solar spectrum and that unique engineering material, gray iron, may have nothing in common. Yet, to stress a point that gray iron foundrymen must appreciate, I should like to preface this discussion by drawing an analogy between gray iron and the image of a ray of solar light.

The solar spectrum may be simply, and correctly, regarded as the image of the three primary colors or as the wave band of six single, elemental colors: Red, orange, yellow, green, blue and violet. Close examination of the spectrum reveals, however, that it is something more than a simple image of six elemental radiant energy rays. The solar spectrum is actually a wide color band of exceedingly fine gradations, a highly complex mixture or compound of an enormously great number of hues and shades. It contains, it is estimated, hundreds upon hundreds of distinguishable hues in which at least 10,000,000 tints and shades are to be found.

Gray iron may be regarded, correctly and simply, as a mixture of iron and five other elements: Carbon, silicon,

By A. J. EDGAR
Technical Advisor
Gray Iron Founders' Society

...in the Gray Iron Foundry

manganese, phosphorus and sulphur. But in gray iron, too, we can distinguish many hues and shades. What we term gray iron is actually a wide band of materials, a complex series, a family of alloys. And until we appreciate that gray iron is a generic, rather than a specific, term; until we appreciate that gray iron is not simply a mixture of certain elements, but a series of alloys of varying percentages of various elements; until we are aware that gray iron is a complex family of many fine gradations and many, many useful properties, we cannot know our product, we cannot produce it as scientifically as we should, nor sell it as well and widely as it should be sold.

How many hues and tints can be distinguished in the gray iron family? Commercial practice probably does not produce as many as 10,000,000. But consider the possibilities. Take, conservatively, a carbon range of 2.50 to 4.00 per cent, a silicon range of 0.40 to 3.50, manganese in a range of 0.50 to 1.10, phosphorus of 0.04 to 0.50, and sulphur running from 0.04 to 0.20. Vary one of these elements one one-hundredth of 1 per cent and you produce a distinct member of the great family of cast iron alloys. By varying each of the elements one one-hundredth of 1 per cent in the range specified it is possible to save approximately 350,000,000,000 different irons in the usable cast iron family. And the series can be extended by introducing other elements and the many factors which affect gray iron composition and structure.

Gray Iron Presents Wide Variation

Cast iron, gray iron, is indeed, like the solar spectrum, a thing of innumerable tints and shades. There is considerable dissimilarity between one gray iron and another; and the possibility, too, of considerable dissimilarity between the irons poured from a day's heat where careful control is not exercised. It is this possibility of great variation, the very width of the gray iron band, the greatness of the gray iron family that is at once the root of many of the problems surrounding gray iron production and the root of the great possibilities of gray iron in engineering.

If we are to appreciate fully the many useful properties the gray iron family offers, we must be constantly aware of the fact that gray iron is a material of many shades and hues. And we must be aware of the thousands and thousands of variations possible in so great a family if we are to realize the importance of control in the production of gray irons engineered to serve economically and satisfactorily in specific applications. We must appreciate that, unless we exercise the utmost in control, almost anything may result to affect the final product.

The progress of the gray iron castings industry, however, will not be measured solely by the fact that it can produce, should it try, billions of different gray irons. Its future is measured by the care exercised in the production of good gray iron castings, by the control exercised in producing a material that exactly meets the requirements of the application.

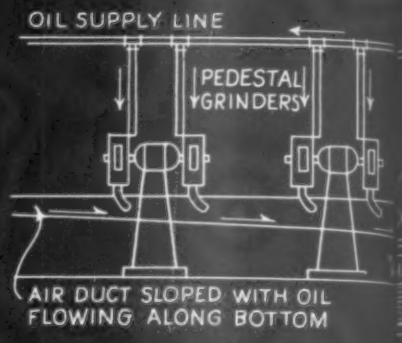
To assure the progress of the industry, all gray iron foundrymen must watch more closely the small details. Otherwise, they certainly will not be able to meet the rigid requirements which will be commonplace as a result of developments in recent years and recent months.

J. S. Vanick of the International Nickel Co., speaking recently at a meeting of the Pittsburgh Foundrymen's Association, stressed these developments by pointing out that today all foundrymen are skilled in producing any tensile strength in a range up to 60,000 pounds per square inch. He illustrated the progress foundries have made in standardizing upon a single mixture for higher strength irons by making one containing approximately 3.00 per cent total carbon and 1.50 per cent silicon, and then alloying this to produce A.S.T.M. grades 40, 50 and 60. New horizons for gray iron, he pointed out, are opened by the industry's ability to produce an iron with a low total carbon content, and by inoculation and alloying with nickel and molybdenum in approximately a ratio of three to four parts of nickel to one part of molybdenum, from a minimum of 1.60 per cent nickel and 0.40 per cent molybdenum to 3.20 per cent nickel and 0.80 per cent molybdenum, to develop tensile strengths of 60,000, 70,000, 80,000 and close to 100,000 pounds per square inch tensile.

The development of higher strengths in gray irons will open fields of use in which other properties of gray irons, such as resistance to fatigue and impact, resistance to heat, corrosion and abrasion, pressure tightness and uniformity of section, will be in greater demand. It is quite obvious that one metal cannot possess all of these properties in high degree unless that metal can be melted by a process which enables the foundryman to control physical structure and to vary it according to the requirements of the application. But we should appreciate that gray iron is a great family of materials and capable of many, many variations.

It may not be generally so regarded, but the cupola, properly handled, is a mechanism capable of manipulation to produce desired qualities in gray iron over a finely graded range. But proper han- (*Please turn to page* 215)

Collection and Disposal of Magnesium Dust



By C. C. HERMANN
General Manager
Claude B. Schneible Co.
Detroit

AUTHORITATIVE literature on the collection and disposal of magnesium dust is indeed limited. There are many ideas and countless opinions on how dust producing operations should be inclosed or hooded, how the dust conductors should be designed, the air velocity to be used, the type of collector to be employed and finally the method of disposal of the collected dust. There is a wealth of experience available on each phase of the problem to be gathered from operatives in hundreds of plants throughout the United States. Although the problem is not entirely new, much time no doubt will pass before the stamp of authority will be placed on any one or given set of ideas and opinions so far promulgated.

Magnesium dust is only one of a number of hazardous dusts which must be dealt with in industry; however, it is one of the most hazardous in foundry operations.

Magnesium dust and chips are encountered in machining operations on magnesium parts in various branches of industry, such as in the match manufacturing industry, munition plants and magnesium powder plants as well as foundries. Dust as produced in machining operations on magnesium castings, dust from grinding, polishing and buffing wheels working on magnesium castings either as a roughing operation in the cleaning room or as a finishing operation in the machining departments, also burring, filing and abrading operations will be considered in this article.

Vigilance Required To Prevent Accident

Granted that the dust from a grinding wheel working on magnesium castings is hazardous. To produce an accident the dust must be ignited. This may be the result of a spark from static electricity or from the striking of metal parts together, or may be caused by a workman carelessly grinding a piece of steel on a grinding wheel allocated to operation on magnesium only. Recognizing the hazard some logical steps should be taken to avoid possible accidents.

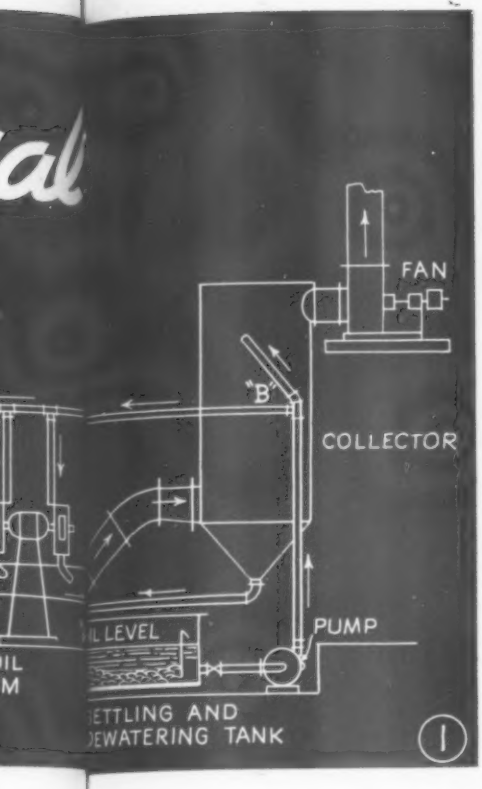
The National Fire Protection Association code specifies clearly the type of motors, starters and static eliminators to be used and method of installation to avoid ignition electrically. In recirculating systems of dust collection the fan and pump motor starters must be interlocked electrically to insure liquid flow simultaneously with air flow. Engineers must design the hoods of materials which are nonsparking, when necessary. Management must see that the grinders for use on magnesium are kept on this material and all spark producing material is kept entirely away. Exhaust air volumes and velocities should conform to the A.F.A. Recommended Good Practice Code and the state code governing the installation. In general a branch (*Please turn to page* 198)

Fig. 1—Sketch of magnesium foundry exhaust system for pedestal grinders and polishers, showing details of oil flow in hoods and ducts

Fig. 2—Collector and conveyor type tank removing magnesium dust from grinding operation on large magnesium castings. Oil is used as dust quenching medium and is supplied to spray nozzles at grinder hood

Fig. 3—Collector installation in magnesium foundry. Oil is recirculated through unit by pump in foreground. All magnesium dust is oil quenched. Duct work to grinders is under floor and drains from wheel hoods to auxiliary tank below floor, from where it is pumped to conveyor separating tank

Fig. 4—Sketch of recommended hood design. Spray nozzle (C) below grinding wheel permits bottom plate of hood to be flushed with moving sheet of oil. Absence of sharp corners and ledges from hood eliminates spots where magnesium can lodge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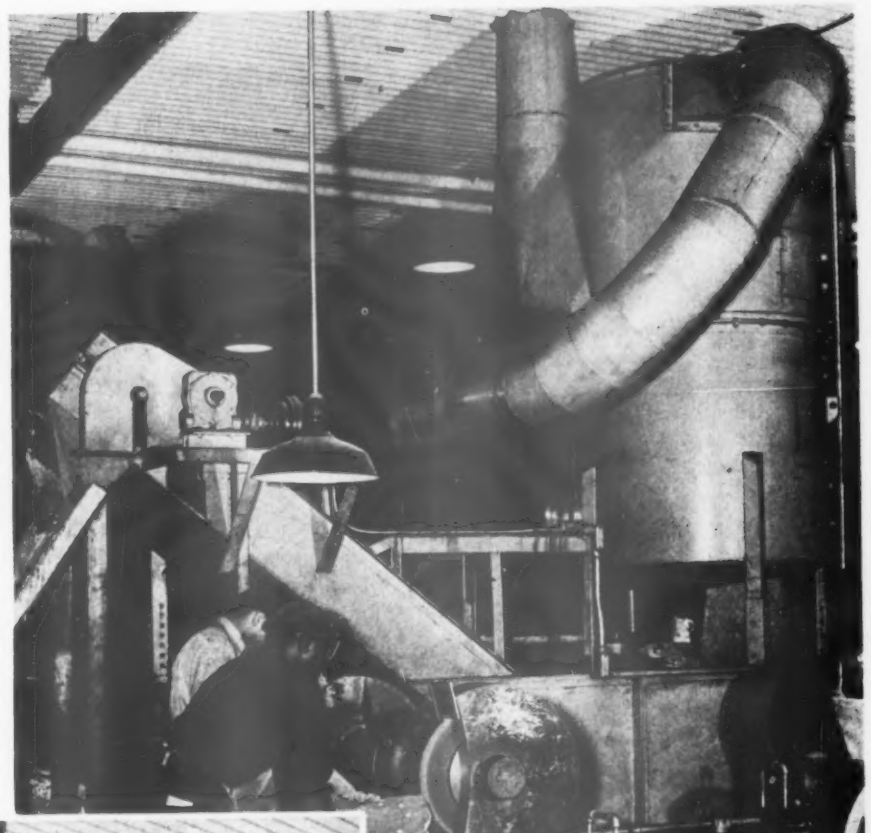
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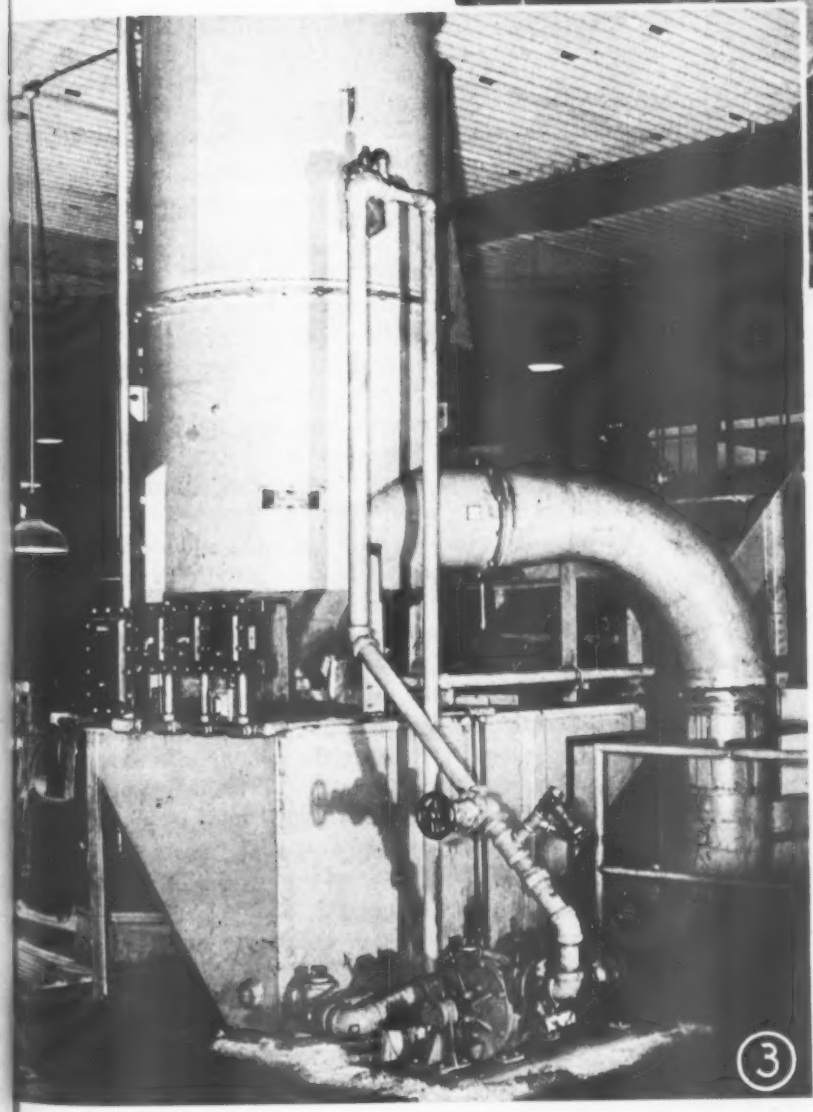
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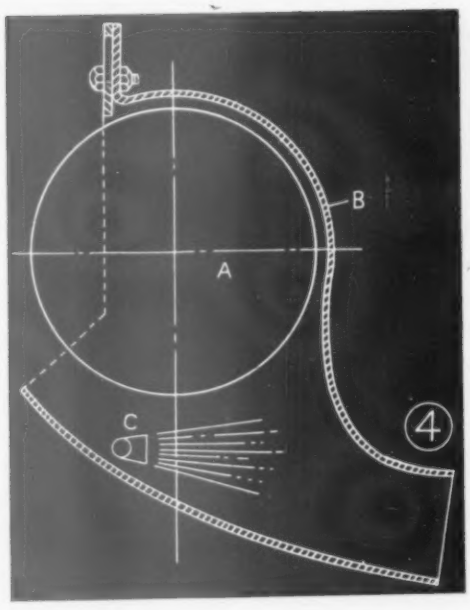
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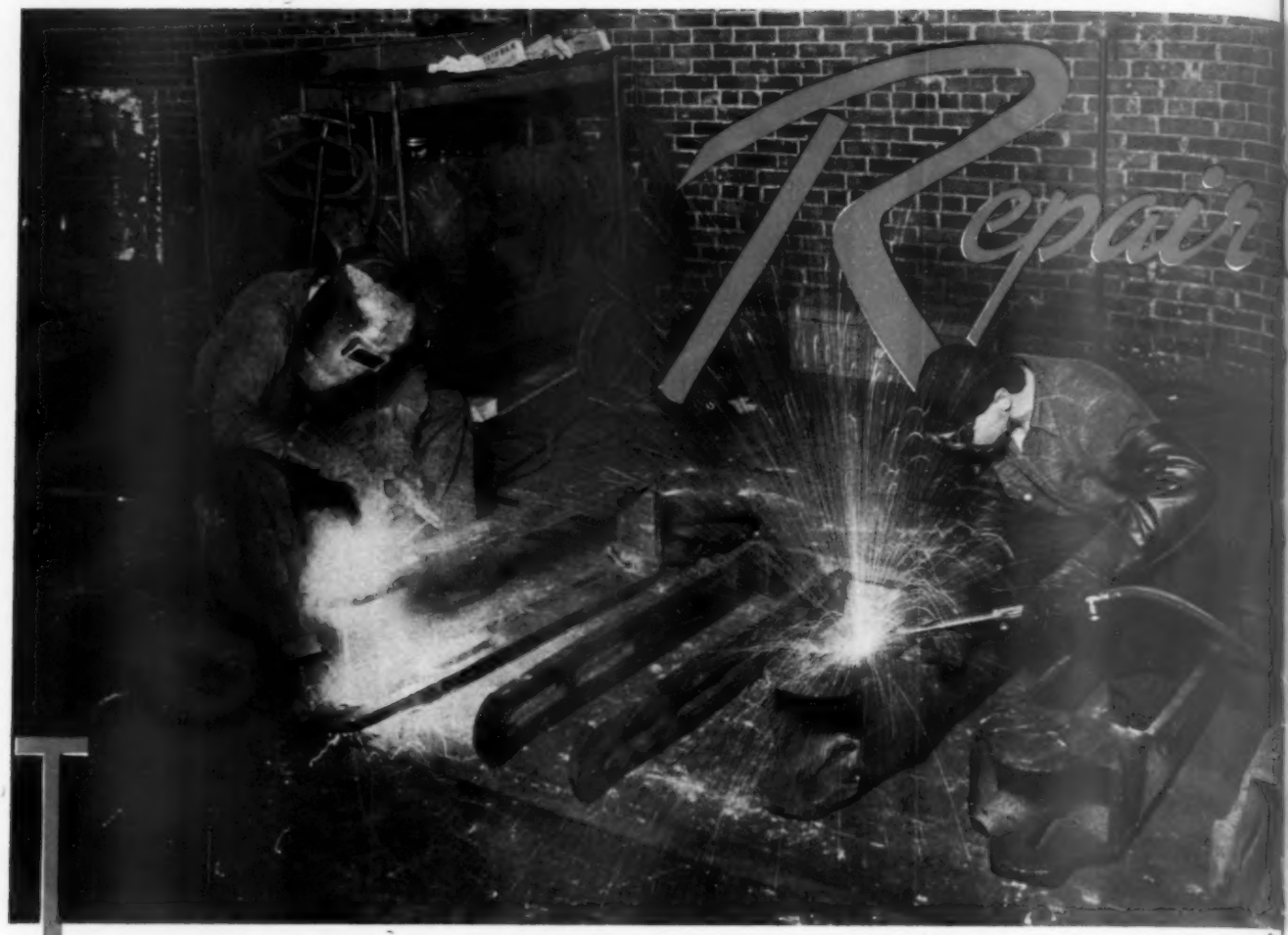


(Photo courtesy Air Reduction Sales Co., New York)

THE intent of this bulletin and the attached Shop Procedures for the repair of defective steel castings, is to clarify "commercial practice" as interpreted by this office and to indicate to casting producers and users as well as Ordnance inspectors, the repairs which may be permitted in accordance with Paragraph 29 of U. S. Army Specification 60-O-1B, and the procedure to be followed in obtaining authority to repair when such authority is required.

II. When agreed upon or unless otherwise stated in this bulletin, contractors desiring to repair castings in the above category must request authority by submitting detailed information covering the procedures to be used for each class of steel (as defined in Federal Specification QQS-681B) together with qualification weld test data as outlined in Paragraph III B-2.

The repair procedures shall be prepared by the prime contractor in co-operation with all concerned subcontractors or where the repair will be performed in the foundry by the foundry subcontractor. Copies shall be submitted through Army Inspector of Ordnance at prime contractor with copies for prime contractor, Army Inspector of Ordnance at prime contractor, Ordnance District where prime contractor is located, local Ordnance District where repair is to be made and two copies to this office (SPOME-E-OCO-D).

Where repairs are to be made in the foundry, foundry subcontractors may apply for authority direct to SPOME-E-OCO-D in order that this authority may cover all castings of any particular class made for different prime contractors.

When a repair procedure has been accepted as satisfactory, by Ordnance Department, this procedure may be used for the repair of all castings falling within the particular class covered by the procedure in question.

The government reserves the right for the purpose of examination, to make nondestructive tests such as X-ray, gamma ray, or magnaflux to determine the full extent of the defects and the satisfactoriness of repair.

In any case where a procedure is found unsatisfactory in service, corrections in the procedure must be re-qualified in the manner described above.

III. Repair of Defects by Welding

A. Minor surface imperfections not affecting the strength or serviceability of the castings may be welded if approved by the inspector. Surface imperfections shall be considered minor when the depth of the cavity prepared for welding is not greater than 20 per cent of the actual wall thickness but is in no case greater than 1 inch.

(Note—The following is given as an individual minority suggestion not acted upon by the committee: While the depth of minor imperfections is limited at 20 per cent of the total wall thickness, there has been no restriction as to the amount of area permitted. It is suggested that in the case of minor imperfections the maximum dimension of the cavity after cleaning should not be greater than twice the thickness of the wall involved. This may not be the best possible ratio but it is believed that the permissible area

OF STEEL CASTINGS

This report covers recommendations for a proposed Engineering Bulletin and Suggested Shop Procedure applying to repair of steel castings. It was prepared at the request of Col. E. L. Cummings, Office, Chief of Ordnance—Detroit by a committee of the S.A.E. War Engineering Board for the use of Ordnance and industry

should vary with the wall thickness.)

B. Defects other than minor surface imperfections may be welded only after authorization has been granted by the Ordnance Department as outlined in this bulletin, with the exception of Classes X, 1 and 2 castings (QQS-681B), which may be repair welded if approved by the inspector. Authorization for the repair welding of defects, other than minor surface imperfections, will be considered by this office provided that the procedures submitted include where applicable:

1. (a) Class of steel.

(b) Approximate composition and condition of castings.

(c) Method of preparation for welding, i.e., chipping, grinding, filing, flame gouging, etc.

(d) Welding position.

(e) Welding processes, i.e., metal arc, oxyacetylene, hot or cold etc.

(f) Type and make of rod or electrode including deposited composition.

(g) Type and make of flux.

(h) Method and degree of pre-heat.

(i) Method of control, i.e., temperature indicating paints, crayons, or pellets, low melting alloy, contact and radiation pyrometers, etc., and minimum temperature at which welding will be discontinued upon cooling.

(j) Method and degree of post heat.

(k) Method of cooling.

(l) Peening operation if such is applied.

2. Weld test plate prepared as outlined in Paragraph V Sketch No. 1 using the declared procedure and having received all thermal treatment applied to the class of steel in question.

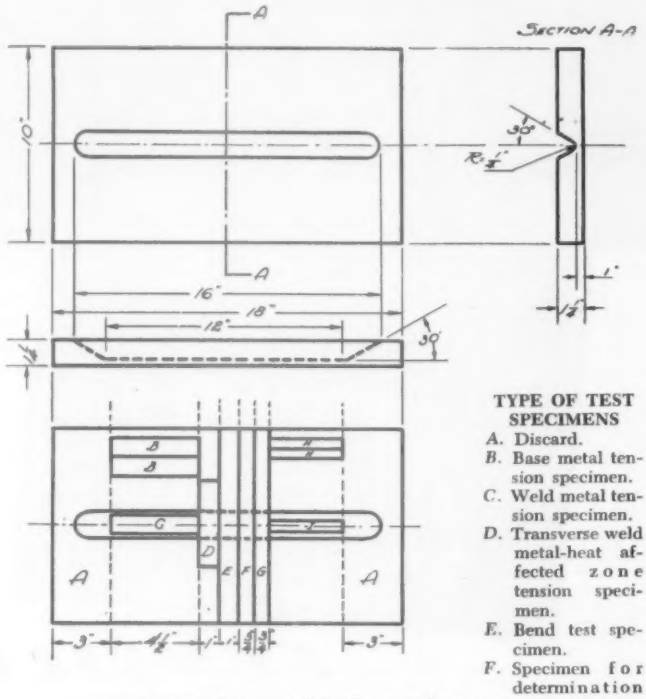
When agreed upon by the Ordnance Department and the contractor, the latter shall, in the presence of the Inspector, conduct tests on specimens obtained from the weld test plate as outlined in Paragraph V and submit the test results with the request for authorization.

C. Certain castings for special purposes may contain critical or prohibited areas in which cases prime contractor in cooperation with OCO-D shall submit to subcontractor properly marked blueprints designating such areas.

1. Contractor desiring to repair weld areas designated critical, must obtain authorization by submitting individual repair procedures stating the part number and name of casting and including information as outlined in Paragraphs III B-1 and 2.

2. Castings containing prohibited areas may not be welded in such areas.

Fig. 1—Weld Test Procedure Qualification Plate



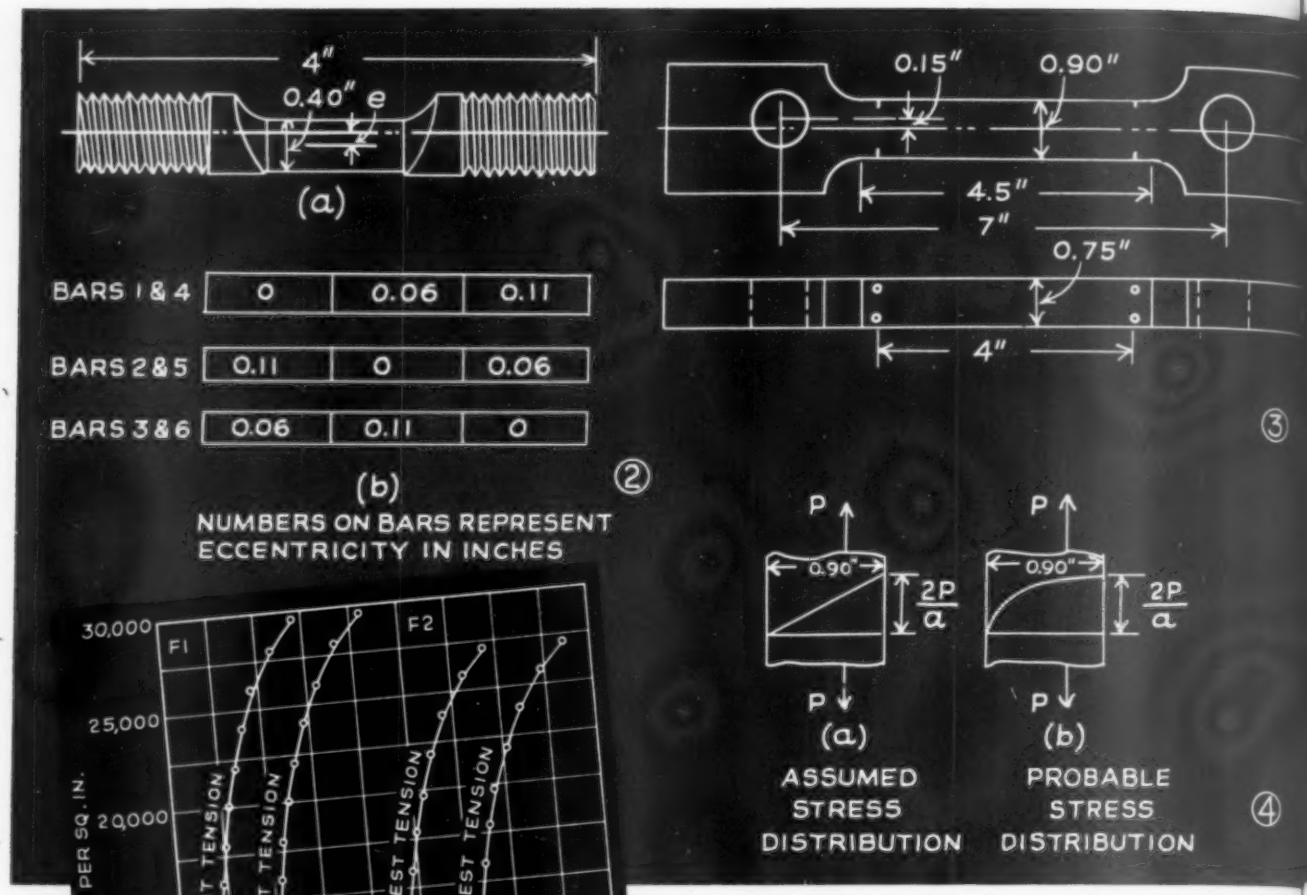
TYPE OF TEST SPECIMENS

A. Discard.
B. Base metal tension specimen.
C. Weld metal tension specimen.
D. Transverse weld metal-heat affected zone tension specimen.
E. Bend test specimen.
F. Specimen for determination of chemistry base metal hardness and macro-examination.
G. Transverse weld metal-heat affected zone impact specimen.
H. Base metal impact specimen.
I. Weld metal impact specimen.

IV. Special Repair Procedures

The following methods are applicable only to the repair of small defects and are particularly suitable for the repair of defects such as blow holes, etc., encountered during machining operations as well as leakers and weepers or seepers encountered either in the foundry, machine shop or in the finished condition.

Authorization for special repair procedures as outlined below will be considered by (*Please turn to page* 250)



Non-axial ... OF GRAY IRON TENSILE SPECIMENS

IT IS generally agreed that with material such as gray cast iron the non-axial loading of tensile test specimens results in a lower strength than would be obtained with axial loading. The extent of this reduction in strength, the conditions which will produce it, and how these conditions may be remedied are questions of importance to those whose product is subject to such tests and, of course, are important to the ultimate consumer. A set of comprehensive tests might well be made to study the matter. However, the natural variation which occurs in gray cast iron would necessitate a carefully planned and well-executed series of tests with material in which the variation has been reduced as much as possible, and with a sufficient number of tests to give satisfactory average results. With these facts in mind the writers present the results obtained with a limited number of tests made at various times with non-axial or eccentric loading.

Among the conditions which will produce non-axial, eccentric loading are two which have been studied: 1. The specimen holders were not free to adjust themselves under load; 2. The central cylindrical portion was not coaxial with the threaded ends.

Condition No. 1 was present in a series of tests made for an entirely different purpose. The specimens were carefully machined and were screwed into oiled, spherical holders which were normally free to adjust themselves but which had been wedged at the top and bottom to produce a definite but unknown amount of eccentricity. Careful stress-strain measurements were made on six gage lines spaced 60 degrees apart around the circumference. The strains which were highest and lowest are shown in Fig. 1 for each of two specimens. These specimens were not loaded to failure under this type of loading, but the curves show clearly the action which was taking place.

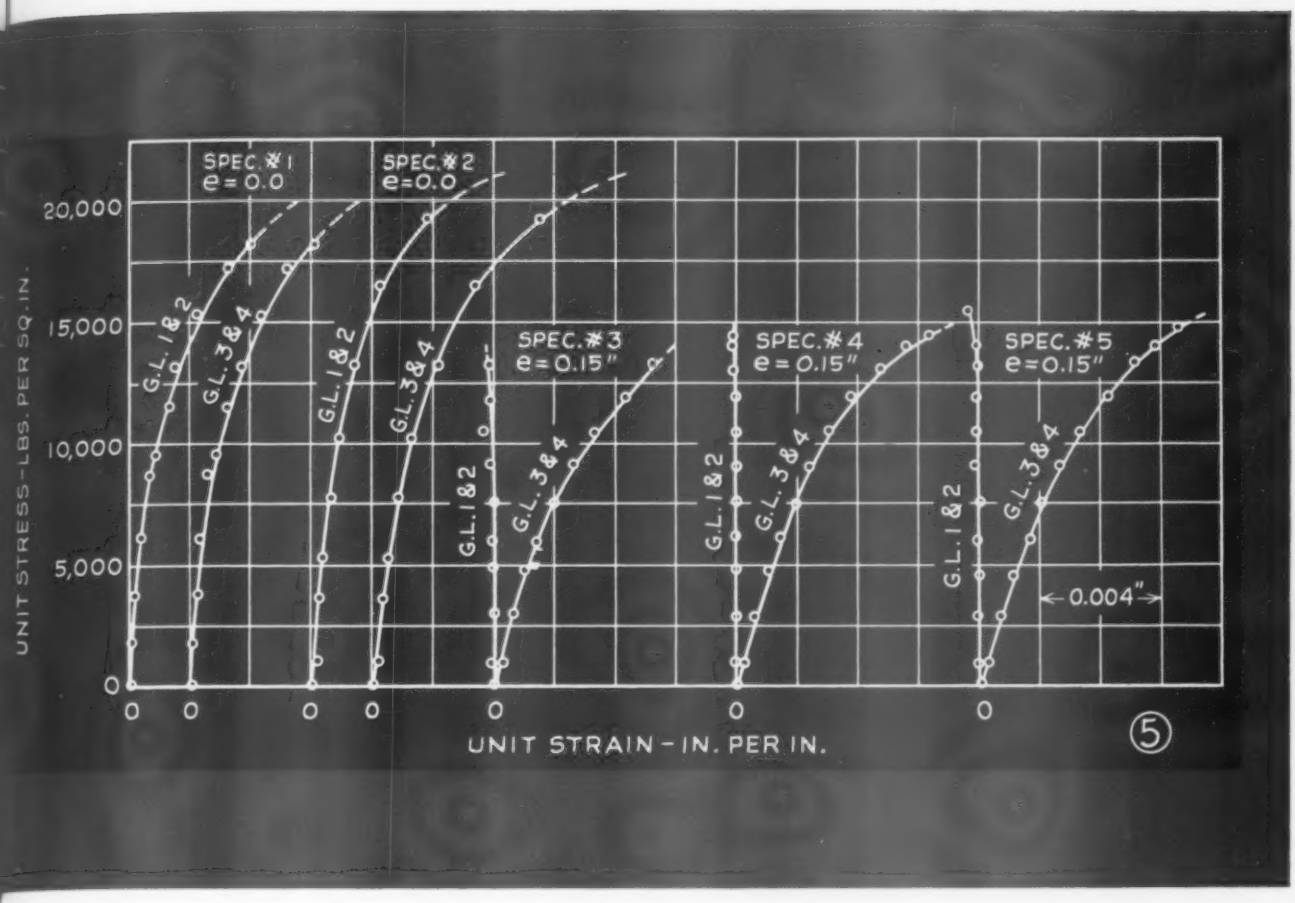


Fig. 1—Stress-strain curves showing effect on solid circular specimens of eccentricity caused by wedged loading pins. Fig. 2—Eccentrically-machined specimens and their location in original bars. Fig. 3—Eccentrically-loaded rectangular specimens. Fig. 4—Distribution of stress over rectangular cross-section of specimen under eccentric load. Fig. 5—Stress-strain curves for specimens loaded axially and eccentrically through pins

Loading

By JASPER O. DRAFFIN
Professor of Theoretical and Applied Mechanics
University of Illinois
and
CAPT. W. LEIGHTON COLLINS
Ordnance Department

It will be noted from Fig. 1 that the effect of eccentricity was pronounced at first, producing considerable compression on one side. but that the compression changed to tension at about one-third of the ultimate strength. While the side which was initially in compression never developed as large tensile strains as did the side which was initially in tension, a large part of the difference vanished. This readjustment of the strains was brought about by a slight bending of the loading pins into which the specimens were screwed, and to an equalizing deformation of the threads of the specimen.

That this relief of eccentricity resulted from the flexibility of the loading pins was borne out by a number of tests, the data for which cannot be given here, but in which the test specimens were loaded eccentrically through devices which could not bend. In the tests made with specimens, which were loaded eccentrically and then carried to failure with an axial load, the ultimate strength was approximately equal to the values obtained by initially axial loads.

Condition No. 2 has a (*Please turn to page* 180)

TABLE I—Ultimate Strength of Specimens Loaded with Various Eccentricities, psi

Bar No.	Eccentricity in Inches					
	0.0		0.06		0.11	
1	30	100	24	500	21	200
2	21	900	25	700	21	400
3	24	100	25	600	19	600
4	25	600	24	400	22	700
5	26	800	24	200	23	600
6	25	100	23	100	22	300
Average	25	600	24	600	21	800

TABLE II—Stress-Strain Data for Axial and Eccentric Loads

Specimen No.	Axial Load			Eccentric Load		
	Maximum Strain, in./in.	Ultimate Strength, psi		Maximum Strain, in./in.	Ultimate Strength, psi	
1	0.0053	20	500	.....	.....	
2	0.0068	19	900	.....	.....	
3	....	.....		0.0059	14	000
4	....	.....		0.0075	15	000
5	....	.....		0.0070	15	500
Average	0.0060	20	200	0.0068	14	800

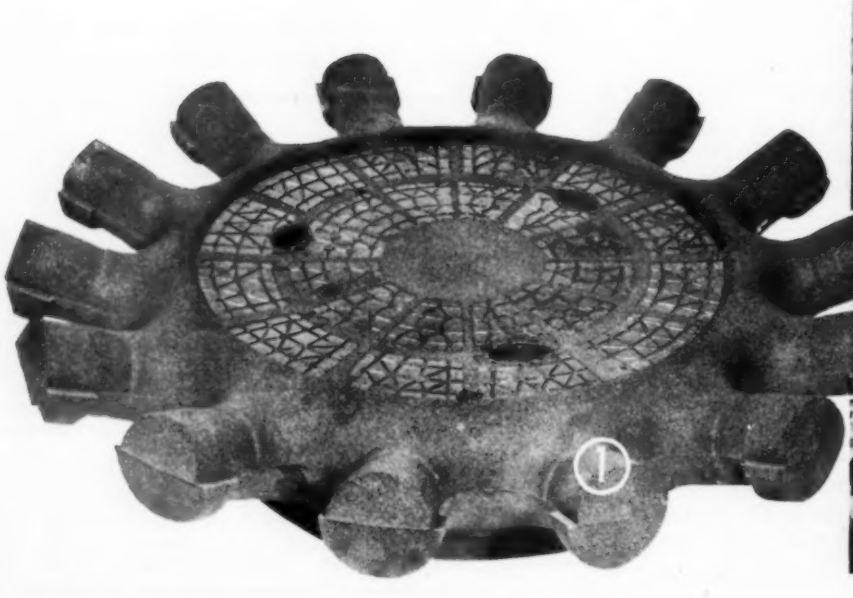
Magnesium Castings for Aircraft Engines

By EDWIN BREMER
THE FOUNDRY
and
HUEY SUMMERS
Wright Aeronautical Corp.
Cincinnati

BY RESORTING to mechanization wherever possible in the Cincinnati magnesium foundry of Wright Aeronautical Corp., employe fatigue is held to a minimum, less dependence is placed on the human element, and better uniformity is maintained in production operations. In the June issue it was mentioned that 80 per cent of the cores are made on coreblowing machines. Two sizes of machines are employed; a large size and a small size. Small size machines are arranged with two types of merry-go-round roller conveyors for handling coreboxes and driers during the various operations. One type of conveyor is circular, with a number of operators located around the periphery. Coreboxes are pushed manually from operator to operator each performing in rotation such operations as cleaning, inserting chills and wires, blowing and drawing the cores. The small cores are drawn with the aid of vibratory devices. The other type of merry-go-round used with the small coreblowers consists of sections of roller conveyor leading to and from the machines, but not connected, so that coreboxes must be carried from one to the other.

Turntables are used with the large coreblowing machines. They consist of four vertical arms on which short sections of roller conveyor are mounted and are manually operated. Alternate arms carry cope and drag coreboxes. Blowplates are suspended above boxes on hooks and are raised and lowered by a hydraulic lift. Four operators are stationed at four points around the turntable. One of the stations is at the coreblowing machine and brings the assembled box to it. The next station leads to a hydraulically powered, rollover-draw machine where the cores are drawn, and at the other two stations various operations of preparing the box for blowing are performed. At each station safety catches are provided so that the table cannot move until the operation is completed.

In making the core for the rear cover casting on a large core blowing machine unit, the first operation, performed by a woman operator, is to blow out all excess sand from the corebox and cover the face of the box with a liquid parting compound applied by a rag. Then she places two reinforcing rings in position. The outer ring is made of ⅜-inch diameter steel wire and the inner ring of ¼-inch diameter wire. These are followed by placement of one bent



This is the second and concluding article describing operations of the magnesium foundry of Wright Aeronautical Corp., Cincinnati. The first article appeared in the June issue

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Fig. 1—Core for supercharger front housing

Fig. 2—Drag half of mold for supercharger front housing, showing gating arrangement as well as assembly of manifold core and balance of smaller cores for drag assembly. Drag is molded in green sand

Fig. 3—Machine for blowing smaller cores. Eighty per cent of all cores used are made on core-blowing machines

Fig. 4—Assembly of a number of individual pieces make up this core for the oil sump casting

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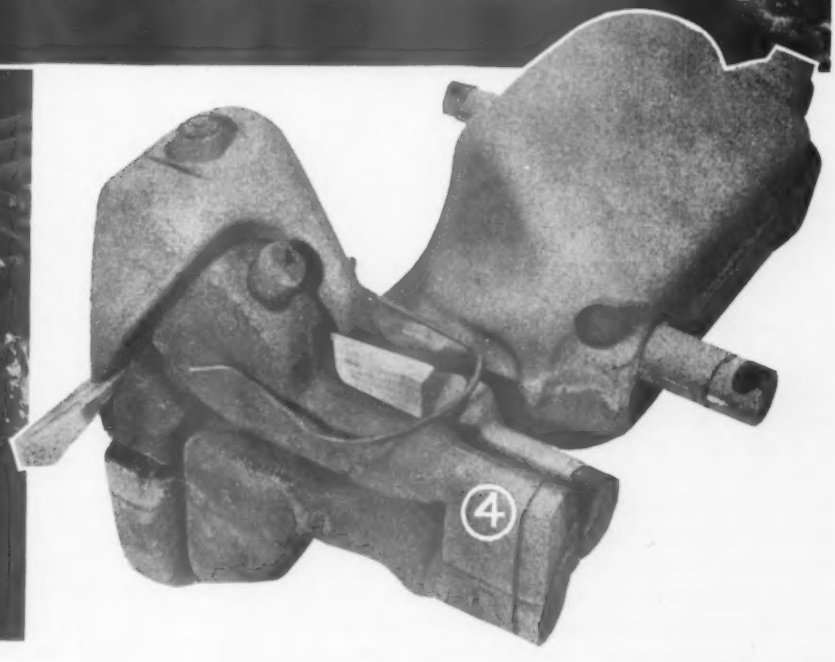
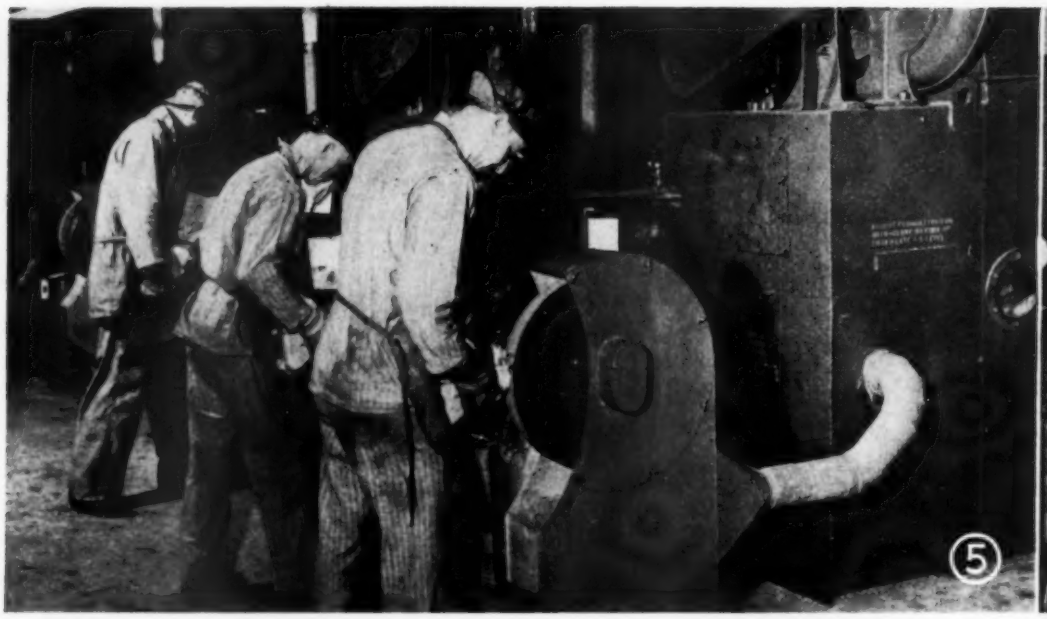




and one straight wire, which are located on ⅛-inch diameter studs with v-notch tops. All reinforcements must be perfectly level and well centered.

The turntable then is indexed to the next or second station where two men operators are located. The first operator lowers the blowplate over the corebox, cleans it off with an air hose, and with the aid of the second operator pushes corebox and plate under the blowing machine. The second operator then blows the core. Following blowing, the box is taken away from the machine; lifting hooks are attached to the blowplate and it is moved away. Now four wire hooks or handles are forced into the sand a uniform distance apart. These are baked in place and are used later for handling the core when it is placed in the mold.

Two operators man the third station, and place aluminum dryer shells in impressions left by six pieces mounted on the under side of the blowplate. Little vertical cylinders of sand left by the vent holes are struck off, and the corebox is indexed to the fourth station manned by two operators. At that station a special dryer plate made of aluminum with a central depression to accommodate the hub end of the core is placed over the corebox and clamped. The whole assembly then is moved over a short section of roller conveyor to a rollover-draw machine where it is clamped automatically by air. A wood bottom board is placed on the platen of the machine, and the corebox rolled over.

The drier plate is unclamped from the corebox and the machine set in vibration. Then the corebox is drawn slowly upward from the core and drier plate. When the corebox is clear it is rolled over to the upright position, unclamped and placed on the turntable to go through another cycle of operations. A double-fixture gage is set over the core to see that it conforms to the limits of 1/64-inch high or low. Core oil is applied to some of the weaker sections to insure stiffness in later handling and the core is placed on the platform conveyor to be carried to the oven for baking.

The external core for the rear housing casting is made on a heavy duty rollover machine. First operation is to place 12 chills and 4 central loose pieces in position. A layer of facing sand, which differs from the rest of the core sand only in that it contains 0.5 per cent more moisture, is thrown into the corebox with force to a depth of about 2 inches. This sand is rammed into place with wood rammers, and a ⅛-inch wire reinforcing ring centered in the box midway around the outer circular area. The ring has humped portions to pass over the gating system incorporated in the core.

A second layer of sand about 3 inches deep is thrown in and rammed. A second reinforcing ring the same diameter as the first is superimposed over it, and two rows of 60-penny nails are pressed home at intevals of 2 to 3 inches around the inner and outer edges of the ring. Another layer of sand 2 to 3 inches deep is thrown in and rammed, and a third reinforcing ring placed in position. Four No. 7 gage steel hooks formed like the letter W are imbedded in the sand for later handling, the corebox is filled with sand and is rammed solidly in place. Then the excess sand is struck off.

Core Supported on Sand Bed

Four central loose pieces are removed and replaced by an aluminum bedding frame which surrounds and partially fills the cavity. The frame extends the full depth of the corebox, and is removed in a later operation. The bedding frame permits the space between the frame and the core itself to be filled or built up with bedding sand, which will give horizontal support to the core during baking. The hollow interior left by the loose pieces allows escape of gases during baking, and promotes more rapid cooling after the core is removed from the core oven.

Bedding sand is rammed solidly in the area between the core and the frame, and the excess sand struck off. A perforated aluminum alloy coreplate about ¾-inch thick with 1¼-inch supporting ribs arranged in grid form, is centered on the corebox and clamped in position. The perforated coreplate not only permits the escape of gases during baking, but also permits more exposure of core surface to the baking heat, and hence, more uniform and rapid baking. After the coreplate is clamped in place the operator sets in (*Please turn to page 224*)

Fig. 5—Individual exhaust units are attached to stand grinders to collect magnesium particles during removal of surplus metal around flanges and edges of castings

Fig. 6—Booths where rough surfaces of castings are burred and buffed. Booths are in pairs, back to back, with down-draft exhaust through water curtain

Fig. 7—Using radial drill to remove stubs of large risers from supercharger rear cover casting

Fig. 8—Specially designed machine using saw head to remove gates and risers from supercharger front housing

Fig. 9—Cutting risers from oil sump casting by means of band saw

Pressure Casting

ALUMINUM MATCHPLATES

By J. P. CALLAHAN

IN THE manufacture of aluminum alloy matchplates by the pressure-cast process metal patterns are preferred and recommended because wood patterns tend to warp due to the large amount of water used in making the unit molds which causes swelling and distortion.

Ingredients for the molds consist of fibrous magnesium silicate or talc, a type of plaster of paris known as molding or casting plaster, and water. Sometimes terra alba or kaolin is used to accelerate setting, but it is not necessary and therefore not recommended. Other materials, such as silica sand, marble dust and similar products, are considered harmful for best results and should not be used.

After the pattern parting line has been determined, a follow board of straight plaster of paris is made and carefully shellacked, care being taken to apply a smooth even coat.

The pattern is coated with a liquid parting, and practice has proved that sperm oil reduced with carbon tetrachloride is splendid for this purpose. However, any suitable liquid oil-wax parting which will not soften the face of the mold and will permit the quick release of the pattern without difficulty and without destroying detail, may be used. Precaution should be exercised in using petroleum-base compounds as the molten metal sometimes follows this type of parting past the face of the plaster mold, resulting in a pitted surface.

The unit flask used, *Fig.* 3, is not the standard type and may consist of four machined steel strips about 1 inch in thickness and in varying widths from 2 inches up. They are adjusted to form any size mold and are readily removed after the plaster mold has set.

This unit flask is set up on a perfectly flat surface such as plate glass or marble. Adjusting these strips on edge to obtain desired depth, the pattern is placed in the recess and is ready to receive the plaster mixture.

Fibrous magnesium silicate or talc and plaster of paris are mixed in dry state in the proportion of 1 pound of fibrous magnesium silicate to 4 pounds of plaster of paris. This dry mixture should be poured into water in the ratio of 1 pound of the magnesium silicate and plaster to 1½ pounds of water, and then should be stirred for about two minutes, or until a thick creamy mixture which will flow (*Please turn to page* 176)

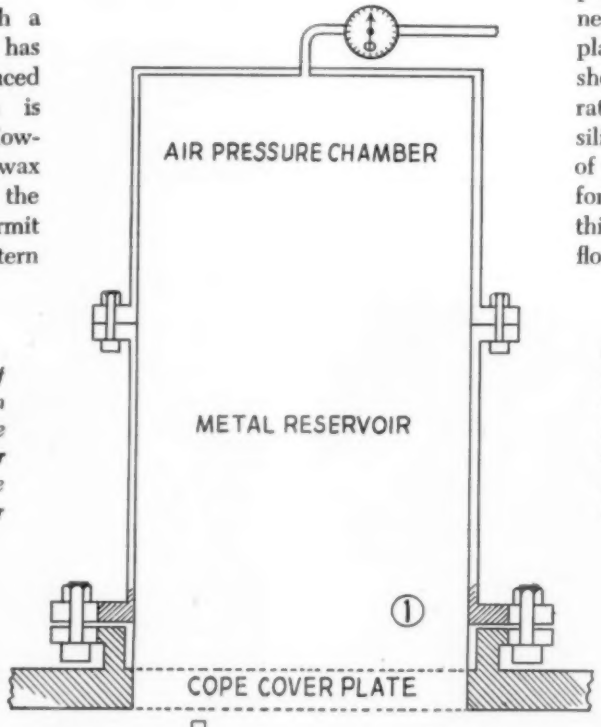
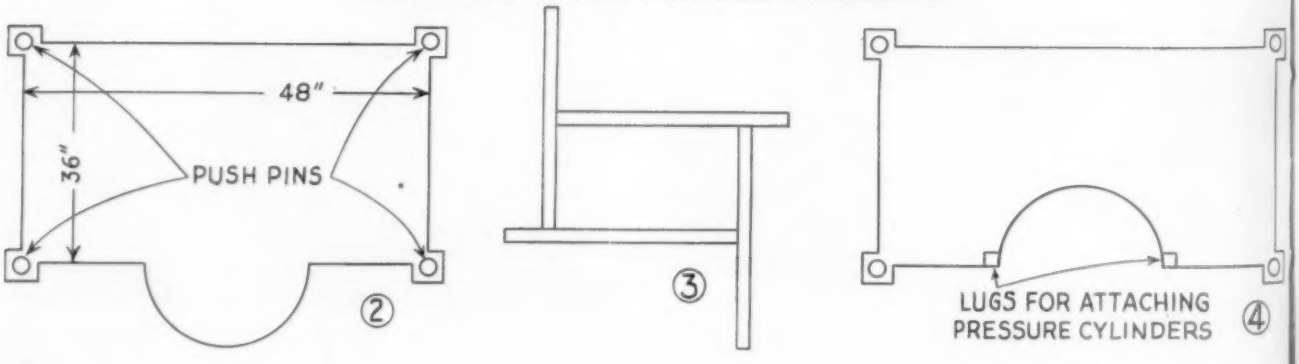


Fig. 1—*General appearance of reservoir for holding molten metal previous to its entrance into the sprue. Fig.* 2—*Master mold flasks for cope or drag are 4 inches deep, and arranged for pouring from the side*

Fig. 3—*Unit mold flask is composed of four steel strips* 1 *x* 4 *x* 5 *inches which may be adjusted to form the desired cavity. Fig.* 4—*Steel top plate for clamping cope and drag molds together contains cut-out for attaching metal reservoir*



There Were Skilled Men in Those Days

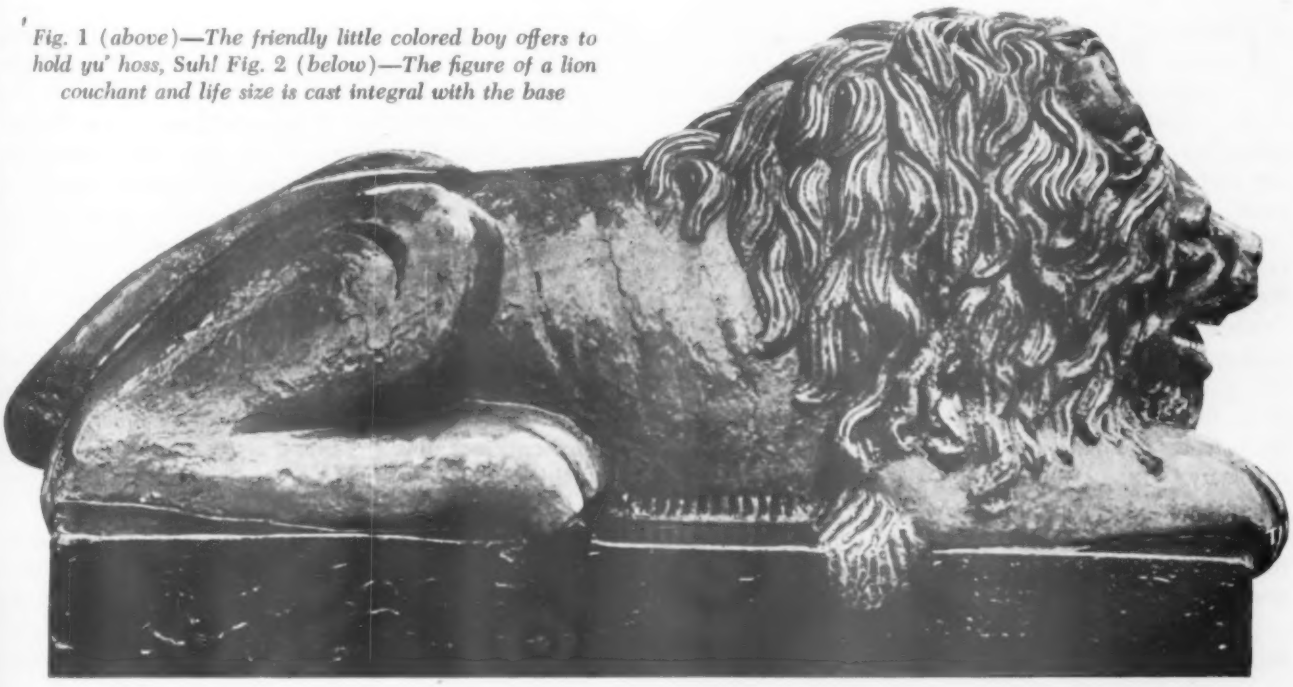
By PAT DWYER
Engineering Editor
THE FOUNDRY

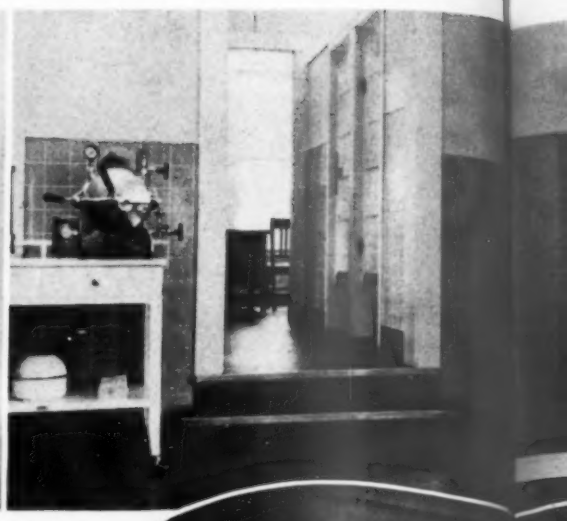
MODERN foundrymen are entitled to a proper and legitimate pride in the high plane to which the art and science of casting metals has been raised in recent years. Systems have been developed for the intelligent control of the raw materials, for the molding and melting process and for the definite chemical composition and physical properties in the finished product. Mechanical equipment has eliminated most of the manual labor and has shod the foundry with figurative seven league boots. Despite recent emergency restrictions of supplies, equipment and manpower, castings continue to pour out of the foundries in prodigious volume and in quality up to the highest expectations. In any industrial roll call the foundry is entitled to a place front and center, or at any achievement banquet to a place at the main table well above the salt.

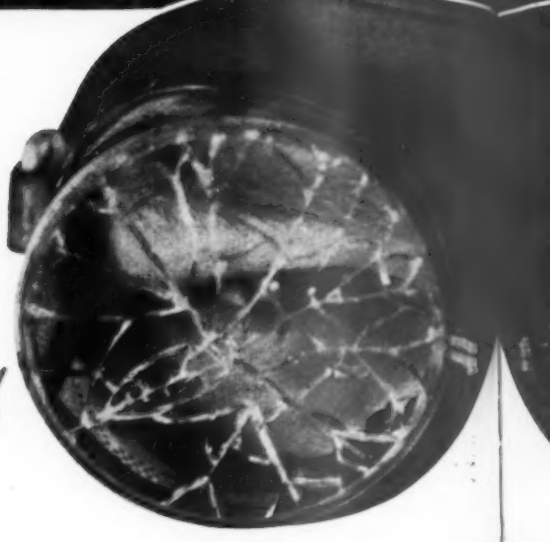
In mass production and scientific control the foundry industry has made remarkable progress, but stray bits of evidence turn up occasionally to show that in ingenuity, manual skill and dexterity, foundrymen long since moldered into silent dust, turned out castings that would tax the resources of the most modern foundry to duplicate. Whether due to the well known and innate modesty of foundrymen, or to the remarkable manner in which one generation utterly forgets personalities and achievements of a former generation, no exact record is available on the equipment and methods employed in the production of some of the castings shown in the accompanying illustrations. The castings, part of extensive collections, are the property of and are shown through the courtesy of Austin Young, Canton, O., and Otis D. Clay, Tuscora Foundry Sand Co., Canal Fulton, O.

According to a somewhat (*Please turn to page* 240)

Fig. 1 (above)—The friendly little colored boy offers to hold yu' hoss, Suh! Fig. 2 (below)—The figure of a lion couchant and life size is cast integral with the base







First Aid Facilities GROW WITH THE COMPANY

By R. H. COONEY
Boston-North District Claim Manager
American Mutual Liability Insurance Co.

THIS is the story of a successful New England company—the Barbour-Stockwell Co., Cambridge, Mass.—founded 60 years ago and ordinarily engaged as an iron founder, instrument maker, and manufacturer of special machinery. Today, with about 300 employes, 25 per cent of whom are women, practically all of the company's work is for the Army and Navy, specializing in tachometers and radar equipment. The plant has received the Army-Navy "E" and three subsequent repetitive awards for excellence.

Until about three years ago, the plant got along fairly well with a trained first aid man, and scarcely more than 50 square feet of floor space was used for the purpose. With the acceptance of government contracts, however, the business grew and services of a graduate nurse became necessary. One of the early observations of the nurse was the frequency of eye injuries. Accordingly, an educational campaign was conducted to encourage the use of goggles in operations where there were eye hazards. Following that program there have been no serious eye injuries.

Since the arrival of the nurse, there has been not one infection from any reported injury. However, infection *has* occurred when patients have had injuries which they have taken care of themselves. The most prevalent injuries now reported are lacerations, abrasions, and contusions.

Model quarters, with the finest facilities obtainable, occupy more than 600 square feet of floor space which are devoted to a first aid room 18 feet square, two rest rooms with a bed in each, and a doctor's office about 12 feet square. The quarters have ample outside light, white ceilings, cream walls for the upper two-thirds, with lower third of the walls green tile. The quarters have nickel and black trimmings and a dark mottled linoleum floor. The effect of this combination makes a pleasing relief from the glaring white walls so frequently considered essential. The first aid room contains the most modern equipment, including sterilizers, instrument cabinet, dressing table, waste receptacle, two pedestal wash bowels, one foot tub and nurse's desk.

The nurse is under the supervision of the plant doctor.

An employe, who recently celebrated his 55th anniversary with the company, stopped in to examine the new shiny first aid room and told the nurse that in his early years it was his duty to apply (*Please turn to page* 238)

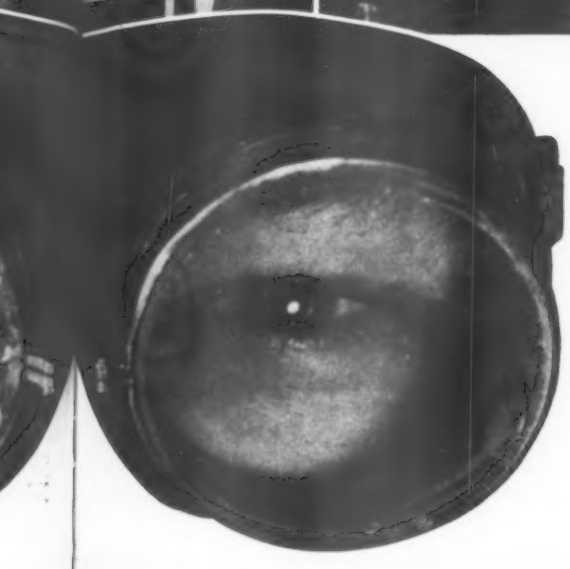


Fig. 1 (top left)—Registered nurse dressing finger injury of patient in new first aid room of Barbour-Stockwell Co., Cambridge, Mass.

Fig. 2 (top center)—View taken in first aid room, with office of plant doctor in distance. Two rest rooms with beds are located off the corridor

Fig. 3 (top right)—Showing modern equipment of plant's first aid room, with registered nurse in attendance

Fig. 4 (left)—This pair of safety goggles saved sight of one eye of worker when piece of metal flew from casting he was chipping

Fig. 5 (below)—Typical weekly accident record compiled by nurse. Copies go to company president and plant superintendent

ACCIDENT REPORT

WEEK ENDING Dec. 10, 1944

DATE	DEPT.	NAME	ABRASION	LACERATION	SPLINTERS	PUNCTURES	INFECTION	DERMATITIS	BURNS	BLISTERS	SPRAINS	STRAINS	FRACTURES	CONTUSIONS	FOREIGN BODIES	FOREIGN B. EYES	MISC.	REMARKS
11/6/44	Fdry	Chas. Tonelli											1					Two flasks stuck together. He caught his finger between them while lifting them.
11/6/44	Fdry	Harold Bell			1													Pushed nail into palm of hand which was sticking out of stick he was using.
11/6/44	Fdry	Max Briefer													1			Dust in eyes - air borne
11/7/44	Mach.	Arthur Salvador		1														Loosening dog on planer hit fingers against steel plate.
11/7/44	Inst.	Arlene Pope		1														Separating pin on connection knife slipped and cut finger.
11/7/44	Inst.	Edna King		1														Lac. finger removing jig from machine which was in motion.
11/7/44	Inst.	Muriel Allen		1														Lac. hand knife slipped scraping off burrs.
11/8/44	Mach.	K. J. Branch			1													Drill slipped, going into finger.
11/8/44	Mach.	Daniel Butler	1															Finger caught between casting and gear.
11/8/44	Mach.	Theodore Lane	1															Caught thumb on rough edge of steel while picking up steel.
11/8/44	Mach.	L. B. Coleman			1													Ran splinter in thumb from handling boards.
11/8/44	Mach.	Elliot Morgan												1				Steel splinter in thumb handling work.
11/9/44	Mach.	Thomas Fish													1			Steel chip in eye - working on lathe.
11/9/44	Mach.	Joseph DiMarzio					1											Rash on neck and face from oil.
11/9/44	Fdry	A. Hillary			1													Splinter in finger handling core boxes.
11/10/44	Inst.	M. Becker		1														Caught finger in chuck.
11/10/44	Inst.	K. Fitzgerald	1															Hit finger against grinding disc.
11/10/44	Inst.	R. Reisseld		1														Cut finger on support under handle of machine as it slipped out of place.
TOTAL	18		3	6	2	2		1					1	1	2			

Pearl Harbor KEEPS NAVY FIGHTING

Fig. 1—Patternmaker at work at Pearl Harbor Navy Yard foundry. Fig. 2—Tapping electric arc furnace preparatory to pouring steel castings. The foundry operates three furnaces of this type, with capacities of 6½, 1 and ¾-tons, respectively. Fig. 3—Oil fired tilting furnaces with capacities of 900 pounds each for melting brass

or Foundry

YSHIPS

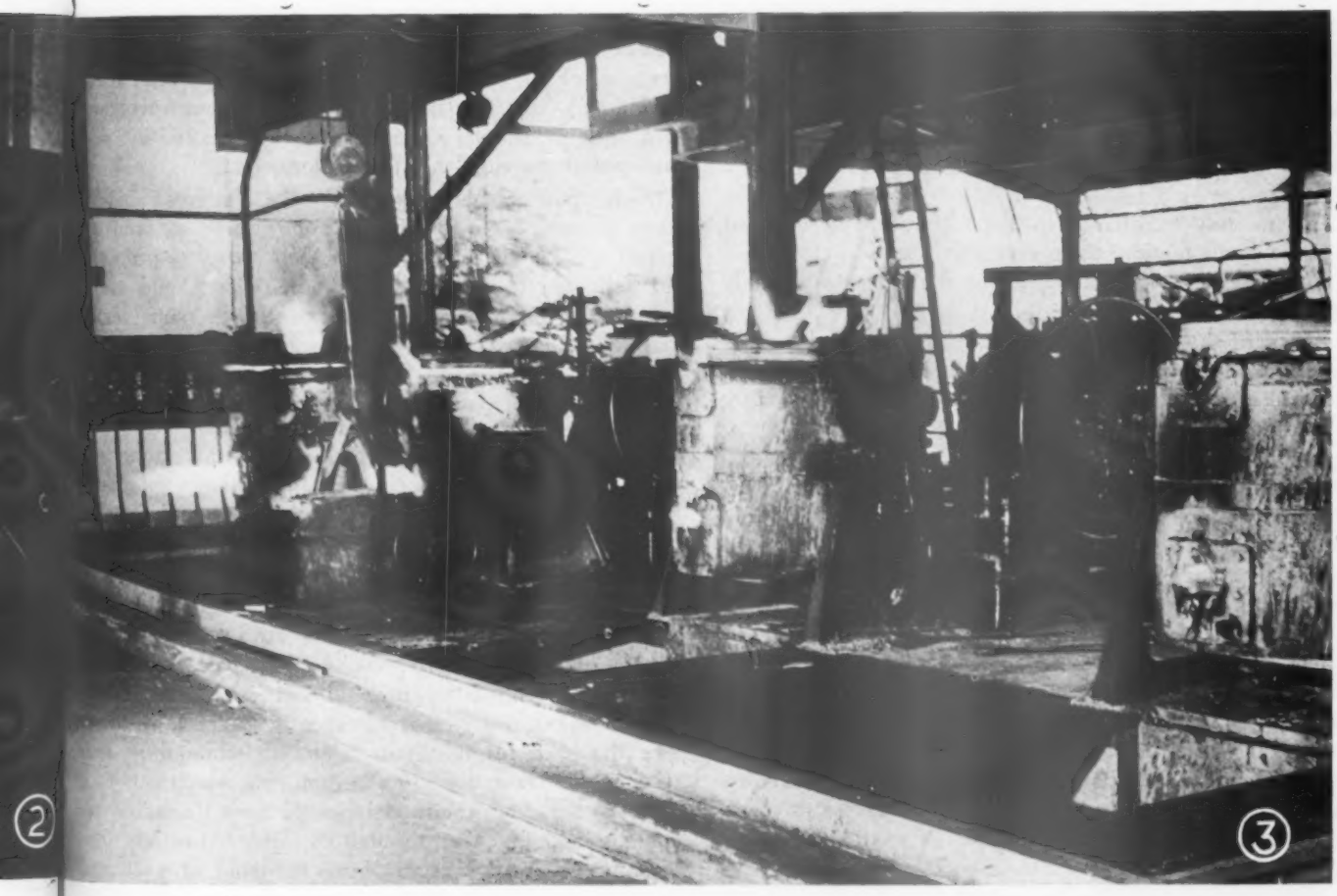
By E. C. KREUTZBERG

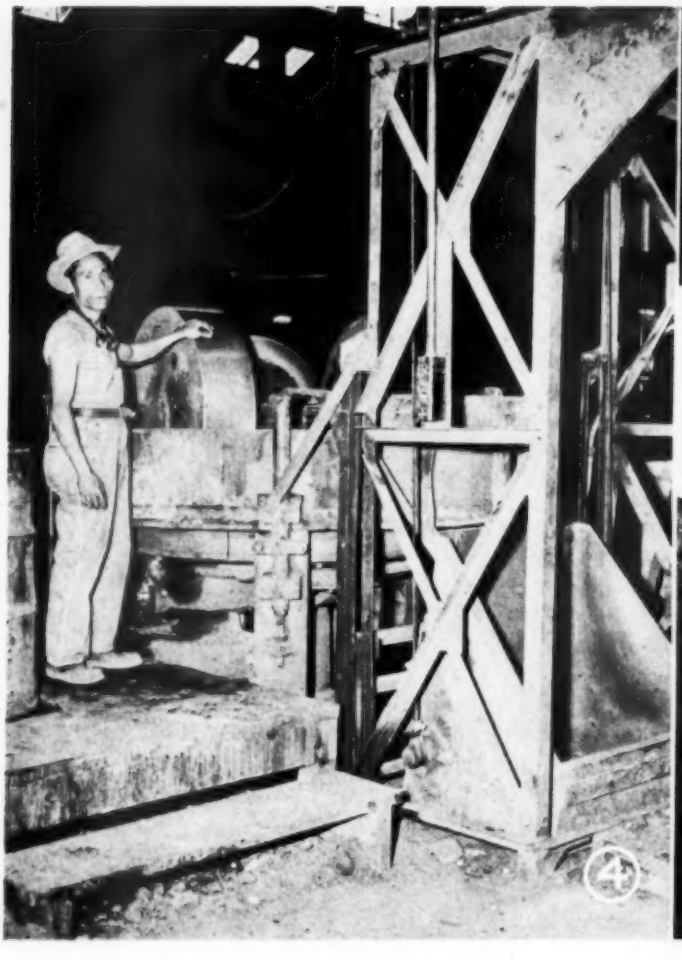
E. C. Kreutzberg describes the important role of the foundry at the Pearl Harbor Navy Yard in keeping the U. S. Fleet in fighting trim. The author is editor of STEEL and, as war correspondent of Penton Publications, recently completed a tour of Pacific bases

THE Pearl Harbor Navy Yard has recovered from the Japanese sneak attack of Dec. 7, 1941. Most of the wounds have been healed and today Pearl Harbor, expanded to about ten times its prewar size, constitutes the backbone of our naval effort in the Pacific war.

Here, 2100 statute miles from the United States, on a glistening arm of the Pacific, between two breathtaking mountain chains, the Koolau range on the one hand and the Waianae on the other, is the Navy's westernmost foundry. It is the only complete foundry between the American mainland and Japan, for it is equipped to produce gray iron, steel and nonferrous castings in all desired compositions. This foundry incorporates a number of notable features.

One is that the foundry staff never knows ahead of time what castings it will be called on to produce. Another is that it must get on new jobs fast, for when ships are damaged the Navy wants them repaired in a hurry so that they again may proceed to their battle stations. Another is the polyglot character of its working force. Molders and other workers in the plant come from all over the world. They include Chinese, Koreans, Filipinos, Hawaiians, Portuguese, Negroes and Caucasians, a mixture that perhaps would be impossible in the same degree in any other ter-





ritory under the American flag.

In charge of the foundry and pattern shop at Pearl Harbor, is Thornton C. Bunch, whose navy rating of master molder is equivalent to the title of foundry superintendent that is customary in privately owned establishments in the United States. A native of Portsmouth, Va., Mr. Bunch is a graduate metallurgical engineer and served an apprenticeship as a molder at the Norfolk Navy Yard. In 1935 he was transferred to Pearl Harbor and has had charge of the foundry there ever since.

In these days of swift communications, a ship is barely damaged before the navy decides in radio conversations what yard should do the repair work, whereupon the advance planning unit of the designated yard goes to work immediately so as to be ready when the ship comes in. Thus it is customary to see men working on a new bow or other part to be installed on a damaged ship days before it is due to arrive at the yard. The foundry at Pearl Harbor, for example, gets its orders ahead of time in this way and, operating 24 hours a day and 7 days a week, has the desired castings made and ready for installation well before hand.

This type of operation demands painstaking management so as to prevent any lag along the line. The routing system through the patternshop and foundry may be described as follows, in the words of Mr. Bunch:

"All incoming work goes to the progress section, which is located in the pattern shop. Here the work is given its proper priority rating. From the progress section the work is routed to the engineering and layout section where the job is laid out and pattern shop and foundry supervisors decide on the molding method, location and detail of gates, risers and chills. Next the work goes to the patternmakers, who complete the patterns and coreboxes with the exception of applying fillets, shellac, etc. Filleting, shellacking and other similar work is done by women workers on a finishing bench, where patterns are painted in conformity with the regular pattern color code.

"Next, pattern checkers check the patterns against prints or samples, whichever are furnished, as well as against the layout. Patterns are then recorded properly and delivered to the foundry molding floors, and coreboxes to the core room, whereupon the foundry supervisors take over and assign the work in order of its priority".

Anticipate and Prevent Defects

All gating, risering and chilling, explains Mr. Bunch, is based on the principle of controlled directional solidification. By this practice loss of castings from such defects as centerline shrinkage, bore cracks, internal porosity and tears, and sand and gas inclusions, is practically eliminated.

A number of interesting examples of successful gating and risering at the Pearl Harbor shop are shown in accompanying illustrations. In making bronze propellers, for example, not only is clean metal in the casting desired, but also an extremely close tolerance is sought so as to reduce the need for finish machining to minimum. Propeller molds are gated into a bottom ring which acts as a dross catcher; from the ring the metal flows through a restricted orifice and then through an expanded orifice, thus creating a steady flow of metal into the mold, at a reduced

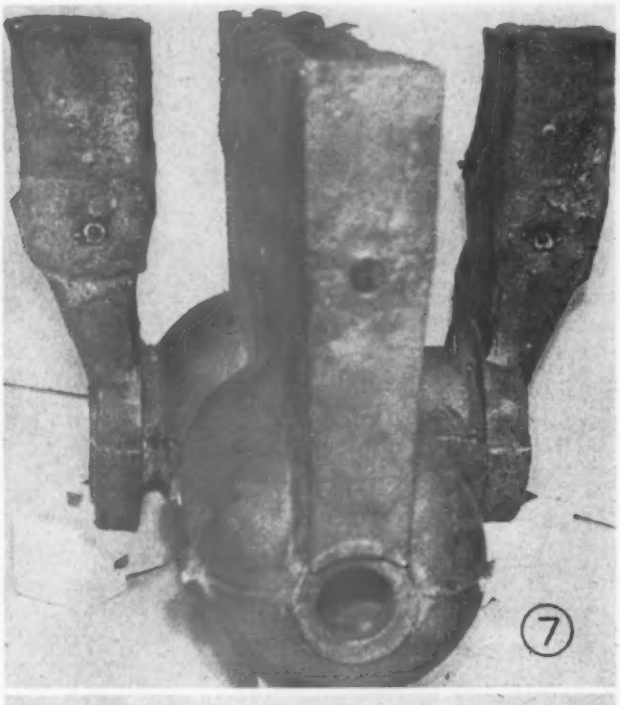
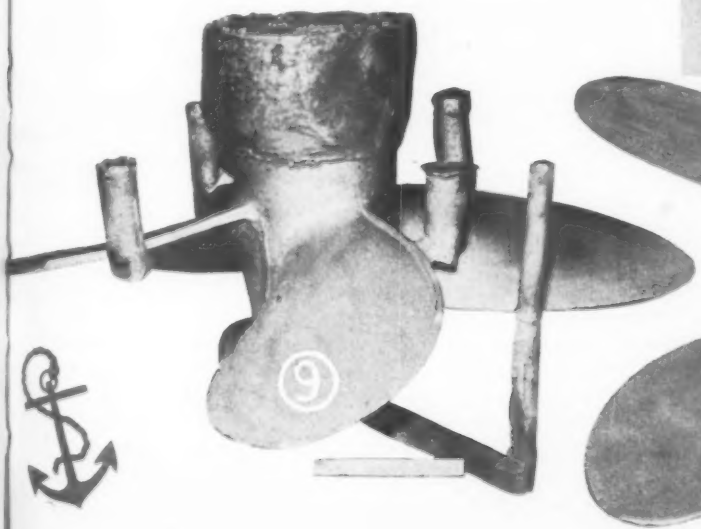
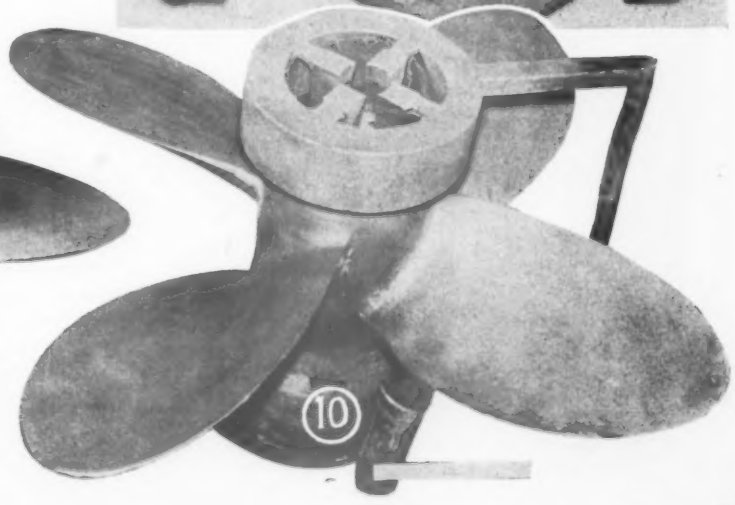
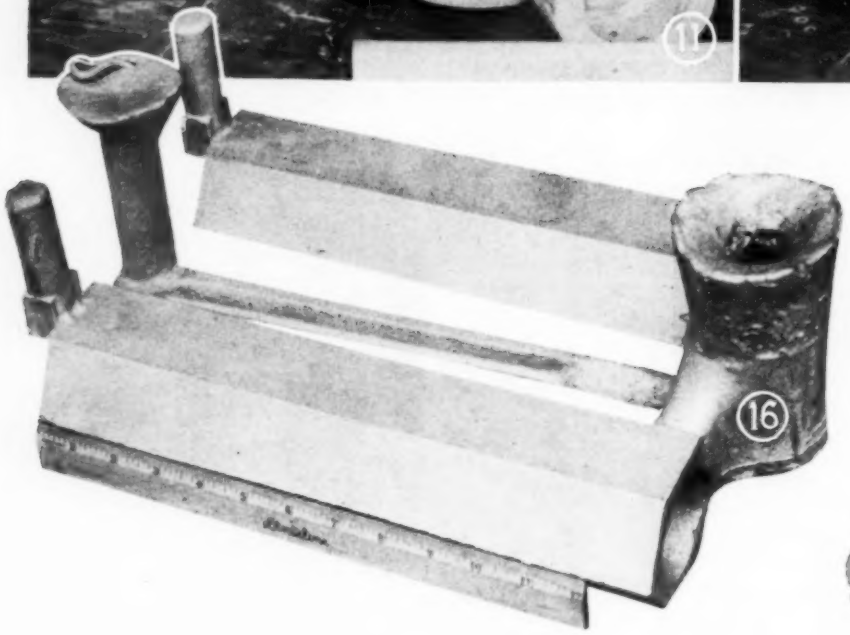


Fig. 4—One of the foundry's sand mixers. Synthetic molding sand is employed throughout the plant. Fig. 5—Shaping a pattern. Fig. 6—Pouring steel castings. Melting capacity permits production of ferrous castings weighing up to 20 tons. Fig. 7—Steam separator casting in as-cast condition. Fig. 8—Same casting as in Fig. 7 after cleaning. Fig. 9—Bronze propeller as cast shown in pouring position. Fig. 10—Reverse view of propeller casting shown in Fig. 9







Figs. 11 to 14—Examples of bronze castings made at Pearl Harbor foundry, showing (left to right) a pump body, valve disc, worm nut and valve body, all in as-cast condition. Fig. 15—View of pattern shop

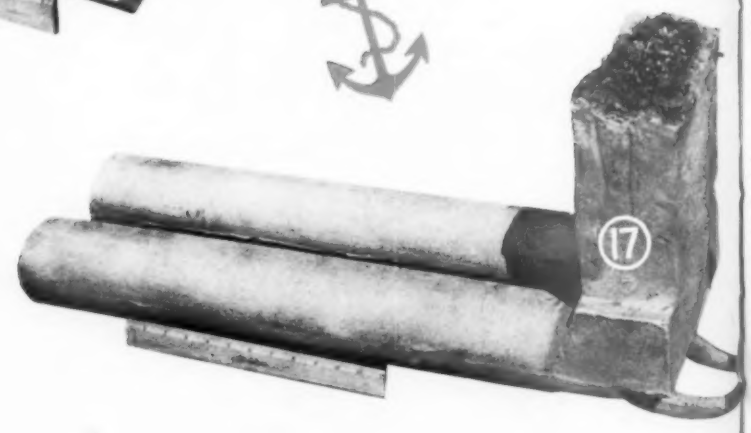
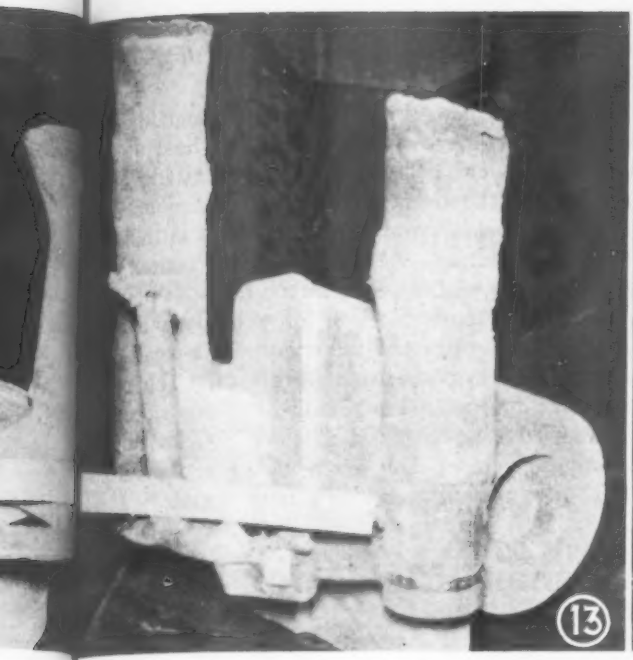
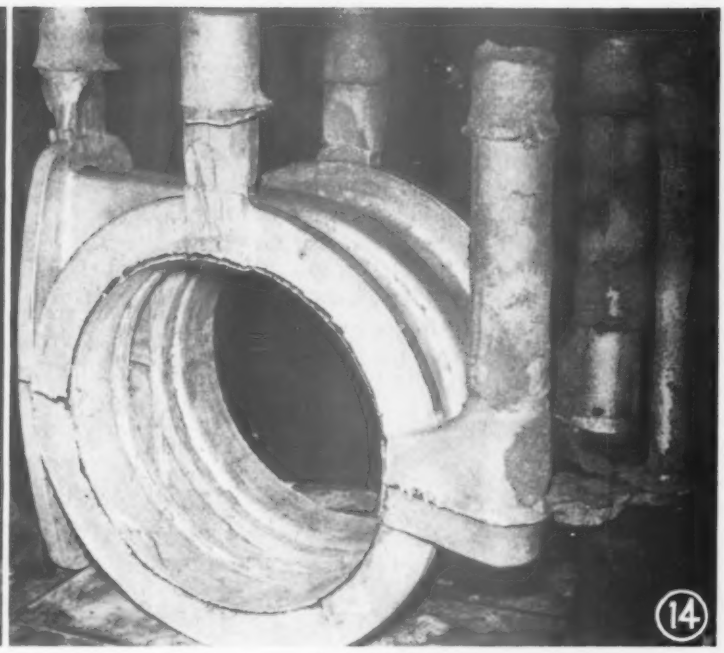


Fig. 16—Horizontally cast bronze hexagon bushings, showing arrangement of gates and risers. Fig. 17—Horizontally cast bronze billets, using double horn gates with big ends opening into heavy riser. Fig. 18—Vertically cast bronze bushings. Print of casting center core extends through strainer core





velocity.

In making carbon-molybdenum steel castings for a steam separator, the foundry employs padded wall construction, the padding extending into the top body riser, as shown in Fig. 7. Flanges on this casting are provided with padded top risers. Cores are set in all open risers, as an added precaution, to insure atmospheric pressure feeding. In cleaning operations, the risers and padding are removed by flame cutting, grinding or machining, or by all three methods.

Melting units permit production of iron and steel castings weighing up to 40,000 pounds, and nonferrous castings up to 10,000 pounds. They include two cupolas lined to 43 and 30 inches inside diameter, respectively; oil fired tilting furnaces with capacity of 900 pounds each; electric high-frequency induction units and three electric arc furnaces, with capacities of 6½, 1 and ¾ tons, respectively.

Large Supply of Scrap Available

Approximately 70 per cent of the metal charged at Pearl Harbor is scrap. This is possible because the scrap available to the foundry is navy scrap of known analyses. Pig iron, as well as other materials, comes entirely from the United States. The foundry in any one month produces castings in approximately 50 different alloys, both ferrous and nonferrous, therefore exacting metallurgical control is necessary. A completely equipped control laboratory is located within the foundry building. This laboratory also is provided with sand testing equipment; synthetic sand practice is employed throughout. Approximately 85 per cent of the foundry sand is reclaimed. In a building adjacent to the foundry are two X-ray units, one operating at 1,000,000 and the other at 220,000 volts, also radium and Magnaflux and Zyglo equipment.

The foundry is equipped with up-to-date standard foundry equipment, including a Hydro-Blast cleaning and sand reclaiming unit, centrifugal casting machines, mold and core sand mixers, coremaking and core blowing machines, core and mold drying ovens, mold conveyors and the customary molding machines and other equipment.

Lighting Coke Bed with Torch

Q.—We are interested in the possibility of igniting the bed of a cupola with natural gas, and would like to know whether that can be done, and the procedure to be followed.

A.—Lighting the bed coke in a cupola with gas or oil has been practiced to a considerable extent in the foundry for many years. Up to the present so far as we know no figures have been published to show a comparison in cost between that method and the usual method of using wood. Method of applying the gas or oil flame shows many variations. Some burners are home made and others are purchased from makers whose names may be found in the advertising pages of THE FOUNDRY. The latter can recommend the proper size for a given cupola as well as information on cost for operation. Manufactured torches also may be used for drying ladles and skin drying molds.

For small cupolas the torch is placed in the open breast and the flame allowed to play on the coke for approximately ½-hour. The time will vary to some extent depending upon the size and condition of the coke. In large cupolas two or more small tunnels extending in v-form from the breast carry and spread the flame in the lower strata of coke. Lighting the coke through the breast opening involves making up the breast after the coke is ignited. That practice is not favored by modern cupola men who prefer to make up the breast and taphole before placing any coke in the cupola.

In the preferred method a hole is cut through the lining and shell just above the sand bed. A hole also is cut through the wind belt in event it extends down to the base plate. The burner is inserted in the opening and the flame travels through the two tunnels in the coke as in the first instance. After the coke is ignited, the burner is removed, and the hole in the lining is plugged with a suitable refractory block or a few bricks and mud. Where an opening appears in the wind belt, a small door is fitted and held in place with wing nuts. The opening may be at any point, but usually is at one side midway between the taphole and slaghole. Coke tunnels may be any convenient size; 4 x 6 inches in a small cupola, and up to 6 x 10 inches in a large cupola.

Questions and Answers

Permanent Molds for Faucets

Q.—In your opinion is it practical to make globe valves and faucets in permanent molds?

A.—The question of whether to use a permanent or metal mold essentially depends upon answers to two points—intricacy and quantity. The first on intricacy relates to the possibility of using permanent molds, and is concerned with section thickness, ability to provide proper feeding, etc. while the factor of quantity is tied up in amortization of mold cost. For example if the mold cost were $200 you would have to charge off 20 cents on each casting if only 1000 were to be produced. However, with 10,000 castings the charge-off would only be 2 cents.

While we can see no reason why globe valves and faucets cannot be produced in metal molds using sand cores to form the openings and seats, it is another matter to say whether or not that method can compete successfully against the usual sand molding method, and that evidently is what you had in mind in your reference as to practicality. Actually the only way you could determine that would be to find out the cost of the mold which would give some idea on how many castings will have to be made to obtain a reasonable rate of amortization for the mold.

We believe that a multiple cavity mold will have to be designed to make the procedure profitable since outside of setting cores, the same number of operations are required for both single and multiple cavity molds, and you will have to estimate the operating cycle of the mold to determine how many castings can be produced in a given period. That figure and the previously mentioned mold cost will have to be known to make a comparison with sand molding to determine which procedure is the most economical.

Casting Defects Are Shrinks

Q.—We are sending two small castings which contain defects in approximately the same position on the cope side. Various opinions have been expressed as to the nature of the defect. Some say it is a blow and others call it a shrink. One of the specimens has the gate entirely in the drag while on the other the gate is in both cope and drag. However, the defect occurs with both

types of gating although occasionally on some days all castings are free from trouble.

A.—Examination of the castings submitted indicates that the small cavities in both are caused by shrinkage. The reason they appear at the junction of the hub and web on the cope side is because that is the last area of the casting to solidify. Metal shrinks in passing from the liquid to the solid state. All castings shrink toward the center for the simple reason that the outside forms a shell in contact with the wall of the mold. Gradually as the wall grows thicker through cooling shrinkage in the volume of metal continues and eventually no liquid metal is available to compensate for the shrinkage in the center. The result is a void or vacuum in the center. If the shell is thin at any point, atmospheric pressure is sufficient to break through, leaving a small or large passage connecting the cavity with the exterior of the casting.

Gravity is another factor in the problem. Instead of moving uniformly from all directions toward the center of the casting, the greatest pull is downward. Hence, foundrymen attempt to compensate for shrinkage by placing risers or reservoirs of metal on top of the casting. So long as the passage between riser and casting remains open, the metal in the riser will sink into the casting and prevent formation of a shrinkage cavity. In the present instance, practical solution for the problem is to place a ¾-inch diameter blind riser 2 inches high on top of the 1-inch hub.

Cupola Slag Is Too Viscous

Q.—We are having trouble with our slag which is so viscous that it requires the full time of a man to keep the slag hole open. We are using a 750-pound iron charge, 35-pound coke split, and 35 pounds of limestone. What is the usual analysis of cupola slag?

A.—Amount of limestone used in the cupola generally is based on the weight of the iron charge and ranges from 2 to 3 per cent. Hence, it appears that you are using too much stone since it should range from 15 to 22½ pounds per charge. Slag compositions vary considerably, but we believe that if the elements are in the following ranges no difficulty should be encountered: SiO_2—35 to 45 per cent, Al_2O_3—5 to 25 per cent, FeO—5 to 8 per cent, MnO—1 to 4 per cent, CaO plus MgO—30 to 40 per cent, and S over 0.5 per cent.

However, those remarks are just guides and the amount of stone to be used and the slag compositions will depend upon a number of factors. One of course, is the amount of dirt, sand and rust entering with the iron charge, and the higher those are, the more stone has to be used. Another is the purity of the stone. As the fluxing agent is the CaO plus MgO content, the stone should be high in that, and low in silica. High ash coke will require more stone than low ash coke.

One method of checking to determine whether the limestone is too high would be to find out if the lining burnout is excessive. Excess stone requires silica, and tends to erode the lining to obtain that compound. However, excessive burnout of lining may be due also to high blast or poor blast distribution. Several methods are available for thinning out the slag if it is desirable not to change the quantity of limestone. Addition of silica or molding sand may do the trick, but we believe that addition of soda ash or fluorspar is a better procedure.

May Use Brakeshoes in Charge

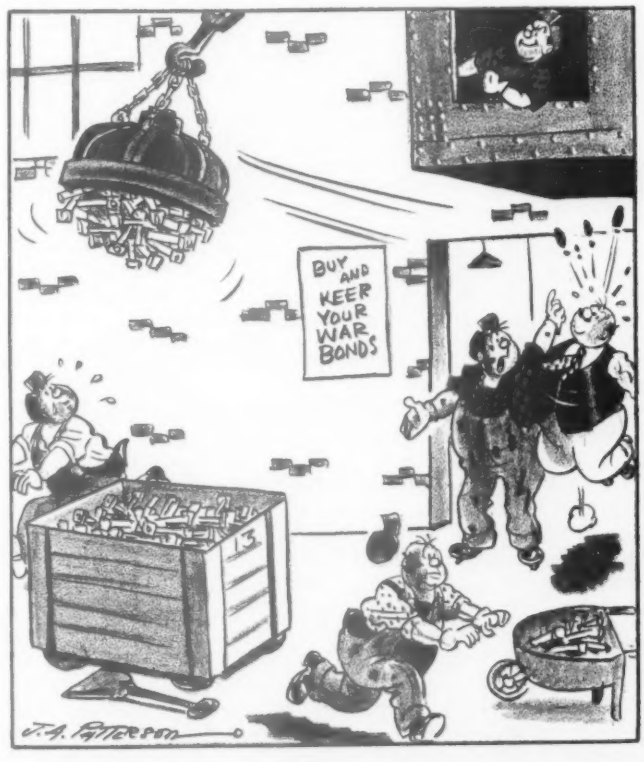
Q.—We have about 20 tons of scrap cast iron brakeshoes on hand which we would like to use in making a trunnion weighing around 1000 pounds. It must withstand a lot of heavy work and be tough. Trunnion is 30 inches in diameter with a flange 7½ inches wide around the periphery, and a hollow hub 9¼ inches in diameter and 15 inches long. Metal thicknesses are 2⅞ inches for flange and hub, and 2 inches for the web between flange and hub. About what grade would you consider the cast iron in brake shoes—good, medium or poor?

A.—Brakeshoes ordinarily are made from a cast iron containing about 1.3 per cent silicon, and if they have not been lying around so long that they have become heavily rusted, there is no reason why you cannot use them as part of the mixture for the trunnion. Our suggestion for the trunnion would be a silicon content around 1.5 per cent. To obtain that you could use 600 pounds of the scrap brakeshoes, 400 pounds of pig iron containing 2.0 per cent silicon, and to a 1000-pound ladle of molten iron add 2 pounds of 50 per cent ferrosilicon or the requisite amount of one of the several inoculating agents available from advertisers in THE FOUNDRY.

The previous suggestion is only tentative as much will depend upon your particular melting and molding conditions, and materials available. In other words you may have to run the silicon content higher or lower, depending upon your own experience in the production of various types of castings. Also if you have available some of the alloying agents such as nickel, chromium, molybdenum, vanadium, etc., you might want to add sufficient of those to enhance the physical properties of the resultant casting.

GANGWAY!

By J. A. Patterson



"I tell ya' boss you gotta switch that discharged bombardier to another job—he's drivin' all us guys nuts!"

Use an Iron Member In a Trap Gate

Q.—We use a trap gate in which the metal flows down and then up past a flat slab core 1-inch thick, 4 inches deep and 6 inches in length. Some of the slushy material fusing with the metal enters the mold and produces defective or dirty areas in the casting. We shall appreciate a recipe for a core sand mixture to overcome this trouble.

A.—A core or any other body of sand against which a stream of metal flows with considerable force, must be stronger and more refractory than a core in any other position where it is not exposed to erosive action. Possibly a minor change in your present core sand mixture is all that is required to increase the refractoriness. Without an accurate knowledge of your present practice it is impossible to suggest a positive recipe.

Offhand we should suggest that you omit part or all of any bank sand in the mixture and use all or nearly all silica or sharp sand. A typical mixture to resist erosion and penetration is made up of 35 parts silica sand, 4 parts silica flour, 1 part bentonite, 2 parts core oil, and water to temper. The cores are dipped in blacking or silica wash and properly dried. Incidentally, have you ever considered the advisability of using cast iron instead of sand cores for this particular purpose? Taper the thickness from 1-inch at the top to ½-inch at the bottom to facilitate removal from the casting. The life of the slab will be greatly increased by coating it with core oil, sprinkling the surface with sharp sand and then drying it before use.

Mixture for Cores Has Too Much Binder

Q.—We are having difficulty in knocking cores out of our aluminum and brass castings. Core sand mixture is composed of 135 pounds bond sand, 105 pounds banding sand, 4 pounds corn flour, 2 quarts water, 16 ounces core oil and 2 ounces kerosene. Sands are white silica free from clay. The thought occurred that an oxidizing agent which would not decompose below 600 degrees Fahr., and would be unaffected by the slightly moist and oily mix, would break down at 960 to 1400 degrees Fahr. to burn out the binders and leave the core sand easily shaken out of the casting cavities.

A.—While your idea of including an oxidizing agent in the core sand mixture might operate successfully if you could find one which would perform according to the rules you lay down, we believe that you can remedy your trouble without resorting to such procedure. While a quick glance at the figures you give for the core sand mix give the impression that the proportions of the various ingredients bear reasonable relationships to one another, and should not cause any difficulty, conversion of the figures from a weight to a volume basis show an entirely different picture.

For example on the weight basis the ratio of corn flour binder to sand is 1 to 60, and that of core oil to sand is 1 to 240. Using the following conversion values given by Dietert—for dry sand 14.5 pounds per gallon; for core oil 7.5 pounds per gallon, and for corn flour 4 pounds per gallon—we arrive at these volume figures: Core sand 16.6 gaillons; corn flour 1 gallon, and core oil 0.133 gallon. Consequently, on a volume basis the ratios are 1 to 16.6 for corn flour to sand, and 1 to 125 for core oil to sand.

Therefore, it appears that your trouble in removing the cores from the castings is due to the excess corn flour binder. While we believe that the amount can be reduced safely by about one-half, we do not advocate a complete switch without some preliminary work to establish sound practice. In other words it is advisable to make up a number of experimental core mixtures in small but effective batches which can be checked all along the line for results obtained. Observations must be made carefully and accurately on each batch, and enough runs must be made on each to insure a fair trial. In a short time you will find the most suitable compositions for various types of castings.

We note that you are using the same core mixture for both aluminum and brass castings. This has the advantage of a single type for all work, but of necessity must possess a compromise of properties, and thus have certain disadvantages. We think that you will be much better off to have at least two mixtures—one for aluminum and one for brass. Cores for aluminum should be as soft as is consistent with safe handling so that they will crush or collapse readily when the aluminum solidifies and contracts. Also since aluminum is light in weight, the cores should be as permeable as possible.

Honor This Button

More than a million veterans of the armed forces are now entitled to wear this Honorable Service Button which is issued to each individual on discharge from the Army, Navy, Marine Corps and Coast Guard. This badge indicates that the wearer has served his country in uniform, and is now returned to civilian life. All Americans should know and respect this emblem of Honorable Service.

Wants Smooth Surfaces On Bronze Casting

Q.—We are having some trouble with bronze castings made entirely in cores in that the customer is not satisfied with the surface appearance or smoothness. We pour the castings from 85-5-5-5 alloy at 2075 degrees Fahr. Each casting weighs 12 pounds. We have sprayed the cores with various products and obtain the best results with a blacklead spray. Core sand is fine with a mix of one part molding sand. As the castings cannot be finished on the inside, we must find some way to keep them smooth. Castings are sandblasted.

A.—Since the surface smoothness of any casting depends upon the fineness of the sand it rests on during its formative period, the offhand answer to your problem would be to use a finer sand. However, that has its complications as you are well aware since the finer the sand, the greater the tendency toward blows. Still, there is a possibility that a finer sand than you now are using could be employed without running into blows, and we suggest that you try a few experimental cores of finer sand. Possibly, you could use a thin face of very fine sand with the remainder of a coarser sand.

If you do not want to go to a finer sand you could try additions of silica flour, fly ash, iron oxide, etc., to your present sand which being much finer would fill up the voids between the sand grains, giving a smoother surface—and decreasing the permeability. You mention that you have tried various coatings without great success, but there is the possibility that the coatings were not quite thick enough to provide the desired smoothness. It may be necessary to apply two or three coats, drying between coats. One method that might solve your problem is to apply a thick paste composed of graphite and linseed or core oil. It is rubbed on with the fingers so that the voids between the grains are filled. Use of such a paste generally is for preventing penetration of bronzes high in phosphorus, but it may serve for your purpose.

Before leaving the subject, it is suggested that you look into your pouring temperature and deoxidizing practices. You may be able to eliminate some trouble from those sources. Try pouring at various temperature ranges below that employed at present, and then use the lowest one which will give sound castings without cold shuts. Also see that the metal is melted rapidly, and not held in the furnace after reaching a temperature say about 100 degrees above the desired pouring temperature. In deoxidizing, do not use any more phosphor-copper than is necessary—say 2 ounces per 100 pounds of molten metal. Phosphorus tends to increase the fluidity and the ability of the bronze to penetrate between sand grains. Obviously hot and therefore more fluid metal will penetrate between the sand grains to a greater extent than metal at a lower temperature.

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Large or small . . . for all castings in which your customers demand improved physical properties, increased pressure requirements or greater wear resistance . . . Nickel will help you satisfy these demands.

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Specify Hardness for High Tin Bronze

Q.—A high tin bronze of the following composition 86 to 89 per cent copper, 9 to 11 per cent tin, 1 to 3 per cent zinc, 0.2 per cent maximum lead, 0.06 per cent maximum iron, and 0.05 per cent maximum phosphorus, is required to have a Rockwell hardness F-scale of 85 or better. What foundry practice is necessary to assure castings with such hardness?

A.—Generally the hardness of the 88-10-2 alloy varies from 65 to 80 brinell hardness, and according to conversion tables the range in Rockwell F-scale would be 68.5 to 84.4. Hence, it appears that you will have considerable difficulty in meeting the hardness requirements. You do not mention what the castings are, but if they are bushings or similar castings which can be produced in metal molds, we believe that the drastic cooling or chilling developed by that method will maintain the hardness at the highest point. Possibly since the tin constituent is the hardening agent in the alloy, you might be able to obtain higher hardness than that normal for the median alloy by keeping the tin at the highest permissible point, that is to say 11 per cent, the zinc at the lowest or 1 per cent, and the remainder copper. Again you might try keeping both tin and zinc at the outside limits, and decreasing the copper accordingly.

Troubled by Blowholes In Bronze Casting

Q.—We would like to have some information on the practical procedure for melting and pouring an alloy containing 4.25 to 5.5 per cent tin, 0.01 per cent maximum phosphorus, 0.50 per cent maximum zinc, and remainder copper. We operate a sand casting foundry and melt in an indirect arc electric furnace. According to information we have obtained 1900 to 2000 degrees Fahr. is effective for pouring. We are having trouble with blowholes which might well be related to furnace and pouring temperature. It appears that we will have to buy copper and tin to make the alloy as ingot metal is not available.

A.—Your reference to difficulty with blowholes in the castings leads to the opinion that those may result from molding practice rather than with melting, and we suggest that you investigate your sand to see that it is not too wet, and that it is sufficiently permeable to permit the easy escape of gases to the exterior of the mold. If we had a specimen showing the blowholes, we might better be able to tell the cause.

It is quite possible that the blowholes as you call them are the result of gas being absorbed by the metal during melting. Copper is notoriously difficult to handle due to its avidity for oxygen and hydrogen, but you should encounter little difficulty from oxygen in the type of furnace you are using since its atmosphere tends to be reducing. Generally the holes caused by gassy metal are pinhole type just under the skin of the casting, and when exposed during machining are bright and shiny on the interior. Blowholes resulting from mold or core gases usually are open and discolored.

In melting we believe that the most satisfactory method in your case would be to melt the copper in the furnace by itself. Since copper melts at 1981 degrees Fahr., you probably will find that pouring temperature you mention is somewhat low. After the copper is molten and fluid, it is poured from the furnace into the ladle and deoxidized and degasified with a small amount of phosphor-copper, copper boride, copper-lithium, etc., and then the tin is added. That procedure is suggested to prevent the oxidation and loss of tin during melting. Same procedure can be used when return scrap begins to accumulate, and a certain amount is placed in each charge with the copper. Then only enough tin is added outside the furnace to bring the analysis to the desired proportions. Addition of tin will lower the temperature of the metal in the ladle or crucible to some extent.

Breaking Ingot Molds On Anvil Blocks

Q.—May we have information on the proper shape, size and metal composition of an anvil block, steel or iron, on which we propose to break ingot molds and other large scrap castings. How should the base be constructed and buried in the ground to absorb the shock load of a 7-ton steel ball dropped from a height of 7 to 30 feet.

A.—We regret that we have no figures or specifications covering an anvil block casting to be used for breaking ingot molds and large pieces of scrap under a drop ball. So far as our experience goes it is not necessary. The scrap is broken quite satisfactorily in a hollow scooped in the ground. However, it is possible that the work would be facilitated by a metal anvil or block in the bottom of the hollow. This would apply particularly where it is necessary to break the scrap into small pieces. The following suggestions are offered for consideration: 1—Lay three or four molds in the bottom of the hollow to serve as an anvil. When they break eventually, they easily may be removed and replaced by others. 2—Erect a concrete base 3 x 4 x 8 feet, reinforced with steel rails and topped with railroad ties. Lay the empty ingot molds on the ties and fill in the ground all around. 3—Same type foundation with solid covering of steel rails on top. 4—Same type base surmounted by any piece of heavy metal, for example discarded anvil block from idle forge shop. 5—Same type base with anvil block 3 x 3 feet, 6 feet in length, steel or iron and approximate weight 12 tons. It may not be inappropriate to point out that a substantial fence or stockage should be erected to protect any person in the vicinity from flying pieces of scrap.

Advocates Split Type Billet Molds

Q.—We have the opportunity of bidding on a considerable tonnage of ingot molds 48 inches in length, 7⅛ inches outside diameter, open at one end, closed at the opposite end, for casting an octagonal steel ingot 3⅞ inches across the flats at the top and tapered to 3⅜ inches near the lower and rounded end, average weight 400 pounds. We shall appreciate any information on flask rigging, core mixtures, chaplets, molding practice, metal temperature and any other features of interest.

A.—Actual foundry practice in the production of these castings is similar to the practice pursued in the production of the general run of castings of similar weight, shape and size. The really essential features are the shape of the casting and the composition of the metal. Value of an ingot mold is based on the life, or in the number of times it can be used before it has to be scrapped. Maximum life is based first on a metal that contracts and expands freely, and second on the shape and a uniform thickness of metal. Manufacturers of ingot molds use a bessemer iron, either metal direct from the blast furnace, or from the cupola. The cupola charge is made up of bessemer pig iron and ingot mold scrap in various proportions.

Rolling mill practice is favoring the circular type ingot, but ingot molds also are cast in a wide variety of shapes and sizes. Irrespective of the size and shape, the most essential feature is a uniform thickness of metal and this means a rigid anchoring of the core in proper relative position to the outside wall of the mold. The core in the present mold may be held firmly and accurately by a tight fitting print at one end, but the free or floating opposite end must be held by chaplets. Chaplets are objectionable in this particular casting because they introduce a break in the otherwise solid wall, and a possible source of a crack when the mold is in service. However, if they must be used, the head and the stem should be as small as possible consistent with safety.

If the customer is agreeable the mold may be made according to common and accepted practice, and that is in longitudinal halves with male and female joints. When in use the halves are held together with rings and wedges. In this method each half of the pattern is molded face down and leaves its own green sand core. This core must be adequately vented usually with a long steel rod rammed up with the core and pulled out horizontally through the open end before the pattern is removed from the mold. The facing sand in the core contains 10 per cent coal dust, and the face of the core is covered with a coating of plumbago applied with a brush. In some instances the plumbago is applied as a wash and skin dried with a torch. In the event that skilled molders are not available, the hazard may be removed by attaching a core print to the bottom of the pattern to accommodate a smooth dry sand core.

Royers Make Mulled Sand Better!

Royer Model "R" (capacity 40 to 50 tons of sand per hour) installed at the muller discharge at Cooper-Bessemer Corp., Grove City, Pa. This foundry uses a number of Royers.

Royer Model "NRS" (capacity 40 to 50 tons of sand per hour) taking the sand from the muller discharge at the Chapman Valve Co., Indian Orchard, Mass. This user, too, has installed additional Royers as fast as their operations expanded.

Many foundries have found that the quality of their mulled sand can be greatly improved by further conditioning and aerating it with a Royer Sand Separator and Blender.

While mullers do a thorough mixing and blending job, they nevertheless have a tendency to compact and heat the sand, while the Royer opens up the sand after mulling, cooling it and improving its permeability. The sand is doubly aerated by the Royer; once on the belt and again at the discharge. In today's busy foundries the sand frequently leaves as well as enters the muller hot, and when used at once becomes a common cause of molding troubles and defective castings. The Royer quickly cools the sand to a usable working temperature. Sand contamination is automatically removed by the Royer.

Many of the more than 6,700 Royers in service are installed between the mullers and sand storage or conveyor system. These foundries enjoy open, velvety sand—cooled and conditioned as only the double aeration and exclusive "combing belt" action of the Royer can do it. Such sands make better molds and smoother finish castings which require less cleaning. Drops, skids, runouts and discounts are greatly reduced.

Royers are made in ten stationary and portable models to suit the needs of every foundry operating condition. Several of these models were designed expressly for use in connection with mullers and sand systems. Ask for details and Catalog 744.

ROYER

ROYER FOUNDRY & MACHINE CO.
KINGSTON, PENNSYLVANIA

FOREMOST IN SAND CONDITIONING EQUIPMENT

MEN of Industry

DR. C. R. AUSTIN

DR. C. R. AUSTIN, professor of metallurgy at Pennsylvania State College, has been appointed assistant to the president, Meehanite Metal Corp., New Rochelle, N. Y. Dr. Austin had been with Penn State since 1934, where he developed and directed a cooperative program of research in metallurgy in association with several well-known steel companies and allied metallurgical industries. He has also been closely associated with the research activities of Meehanite Metal Corp. for several years. Dr. Austin is a Fellow of the Royal Institute of Chemistry of Great Britain and, subsequent to his association with the National Physical Laboratories of London, he was in charge of metallurgical research for the National Tube Co., Pittsburgh, and later served as section engineer for Westinghouse Electric Corp.

♦ ♦ ♦

HUGH G. ROBERTSON

Hugh G. Robertson, recently elected chairman of Canton District Chapter of the A. F. A., is assistant works manager, American Steel Foundries, Alliance, O. Mr. Robertson was born in East St. Louis, and upon graduation from Purdue University in 1926, he entered the Granite City, Ill., plant of American Steel Foundries as a special apprentice and subsequently was transferred to Alliance. Active in the Canton District Chapter since its organization in 1944, he was vice chairman during the first year of the chapter's activity.

♦ ♦ ♦

Robert E. Rutzen has been appointed foundry superintendent, Wilson Foundry & Machine Co., Pontiac, Mich. Mr. Rutzen's father, Max C. Rutzen, was Wilson's foundry superintendent from 1938 to 1943.

♦ ♦ ♦

Horace A. Deane, newly-elected chairman of the Metropolitan Chapter of the American Foundrymen's Association, is works manager of the Brake Shoe & Castings Division of the American Brake Shoe Co., New York, with which he has been affiliated since 1939. A graduate of the University of Illinois, Mr. Deane was associated with Deere & Co., Moline, Ill., from 1920 to 1939. He was engaged there first as a chemist, later as general metallurgist, and subsequently was concerned with general foundry problems. He joined the Brake Shoe & Castings Division in 1939 as assistant works manager and since 1943 has been works manager. Active in national committee work of the A.F.A., Mr. Deane also has been prominent in chapter affairs. He is a past chairman of the Quad City Chapter and during the past year was vice chairman of the Metropolitan Chapter. He is also a past chairman of the Tri City Chapter of the American Society for Metals.

♦ ♦ ♦

Joseph E. Collins has been appointed plant manager of the foundry division, Reynolds Metals Co., Springfield, Mass. Mr. Collins had been associated with Aluminum Co. of America since 1924 and for the past 10 years was superintendent of that company's permanent mold and sand foundries in Detroit. He has had many years of experience in the aluminum foundry field, his former connections including the Aluminum Castings Co., Bohn Aluminum Co., and the Cadillac Motor Aluminum Foundry .

♦ ♦ ♦

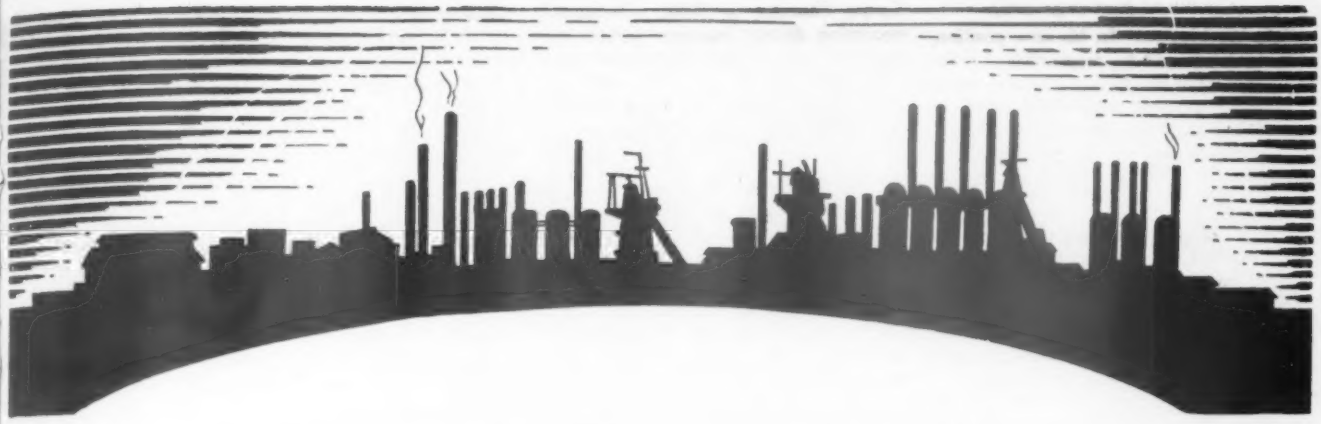
Dr. Donald D. Kennedy has resigned as assistant general manager at Farrell-Cheek Steel Company, Sandusky, O., to become chief of the Commodities Division, Department of State, under W. L. Clayton, assistant secretary. Dr. Kennedy had been at Farrell-Cheek since Jan. 3, 1944. Prior to that time, he was price executive of the Iron and Steel Branch

(*Continued on page* 118)

ROBERT E. RUTZEN

HORACE A. DEANE

JOSEPH E. COLLINS



WOODWARD IS READY!

To Meet the *Switch Back* to Civilian Goods

Reconversion to civilian goods production is under way.

This long awaited period—with its relaxation of wartime controls—finds Woodward ready to step up service to those customers who are switching back to the manufacture of civilian products.

In peacetime—as in wartime—you can count on Woodward for—

Uniform
PIG IRON

WOODWARD IRON COMPANY
WOODWARD, ALABAMA

Independent Since 1883

GENERAL SALES OFFICES: 1515 First National Building • Birmingham, Alabama • Phone 4-6786

(*Continued from page* 116)

OPA, Washington. In his new position, Dr. Kennedy will be responsible for the formulation of policies with respect to intergovernment commodity arrangements and business agreements affecting international trade.

♦ ♦ ♦

J. C. Gore, Chicago manager, Werner G. Smith Co., who has been elected president of the Chicago Chapter, A. F. A., for 1945-46, has been intimately affiliated with the foundry supplies business for 38 years. A native of Mississippi, his first employment was in 1907 as secretary to the vice president, Birmingham Coal & Iron Co., Birmingham, Ala., a company later absorbed by Woodward Iron Co. In 1912, Mr. Gore joined Domhoff & Joyce Co., Cincinnati, pig iron and coke sales agent, and former representative of Birmingham Coal & Iron Co. In September, 1913, he was transferred by Domhoff & Joyce to the Indianapolis office as a salesman, and in the 8 years he remained there he became one of the first to introduce by-product coke as a foundry fuel. The company moved him to its Chicago office in 1921 as manager. In 1924 Mr. Gore joined the St. Louis Coke & Iron Corp. as assistant sales manager with headquarters in Chicago, but 2 years later was appointed sales manager and took up residence in St. Louis. In 1930 he resigned to join the Werner G. Smith Co., Cleveland, as its Chicago manager, a post he has since retained. Mr. Gore has long been active in the Chicago Chapter, A. F. A., and for several years was chairman of the entertainment committee. Elected a director in 1942, his continued activity resulted in his being chosen chapter vice president in 1944, and in this position served capably as chairman of the program committee.

♦ ♦ ♦

W. E. Remmers has been elected vice president, Electro Metallurgical Co., a unit of Union Carbide & Carbon Corp., New York. Mr. Remmers was graduated from University of Missouri and, after a number of years devoted to research and operating experience in iron and steel, joined Electro Metallurgical Sales Corp., Chicago, in 1936, subsequently becoming district manager and division manager. He was transferred to the New York office in 1941 and in 1944 was elected vice president of Electro Metallurgical Sales Corp.

♦ ♦ ♦

Frank A. Sherman, formerly executive vice president, has been elected president, Dominion Foundries & Steel Ltd., Hamilton, Ont. Beginning as a foreman, Mr. Sherman later became general manager of the company. Previous connections include Pennsylvania Malleable Co., Pittsburgh, Mesta Machine Co., Homestead, Pa., Fort Pitt Malleable Iron Co., Pittsburgh, and Pratt & Letchworth Co. He is a former director of the American Foundrymen's Association. In his new appointment he succeeds **C. W. Sherman,** president of the organization since 1912, who recently was elected chairman of the board of directors.

♦ ♦ ♦

Miles K. Smith, metallurgical engineer, has been appointed sales and service engineer in the Pittsbugh office of the Molybdenum Corp. of America. Mr. Smith, who has been connected with the steel industry for 15 years, has had a wide experience in the procurement and use of most of the alloys utilized in the industry.

♦ ♦ ♦

Leo F. McCaffrey, until recently assistant works manager in charge of operation, Algoma Steel Co., Ontario, Canada, has been placed in charge of the metal industries activities of the industrial sales department, Allis-Chalmers Mfg. Co., Milwaukee. He is a graduate of Carnegie Institute of Technology.

♦ ♦ ♦

John W. Lohnes, formerly assistant general manager of sales, Vanadium Corp. of America, New York, has been appointed Chicago district sales manager, with headquarters in that city. Mr. Lohnes succeeds the late Le Roy F. Johnson.

♦ ♦ ♦

Charles F. Codrington has been appointed assistant to the manager of the blower and compressor department, Allis-Chalmers Mfg. Co., Milwaukee. Mr. Codrington was graduated from Texas A & M College, and was associated with Badger Motor Co. before joining Allis-Chalmers in 1930, where he completed the graduate training course and also served in the engine and condenser department. **A. E. Caudle** has been appointed sales manager of the blower and compressor department. A graduate of Oregon State College, Mr. Caudle was associated with Badger Motor Co. before joining Allis-Chalmers in 1939.

♦ ♦ ♦

Henry Martens, founder and former president, Enterprise Engine & Foundry Co., San Francisco, has retired from active service in the company. A native of Oldenberg, Germany, he began a four-year apprenticeship at the age of 15 years with Koch & Franksen Iron Works, in that city. He left there six years later, arriving in San Francisco in 1881, and joined the O. K. Foundry Co., as an iron molder. He spent two years with this firm, and the next three years with several other shops, including the old Union Iron Works. In 1886, with three partners, he started the Enterprise Foundry, which was later incorporated with Mr. Martens as president. Out of this developed the Enterprise Engine Co., Enterprise Oil Burner Co., Enterprise Electric Steel Foundry, Brass & Bronze Foundries, and Process Machinery Division, all of which have been incorporated and now operate under the name of Enterprise Engine & Foundry Co.

♦ ♦ ♦

Martin F. Hilfinger, vice president, A. E. Nettleton Co., Syracuse, N. Y., has been appointed full-time president of Associated Industries of New York State Inc., with headquarters in the Buffalo office of the state organization of manufacturers, effective July 15.

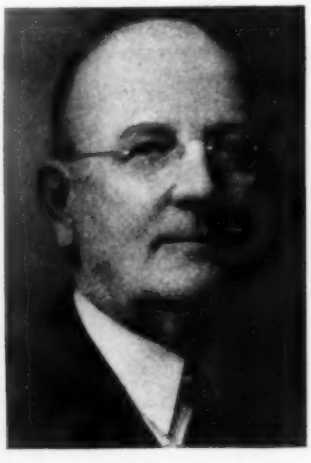
♦ ♦ ♦

Henryk Zimnawoda has been appointed foundry metallurgist, Eclipse-Pioneer Division of Bendix Aviation Corp., Teterboro, N. J. A native of Lodz, Poland, Mr. Zimnawoda was graduated from the University of Danzig in 1929 and became associated with Lilpop, Rau & Loeven-

(*Continued on page* 122)

J. C. GORE

W. E. REMMERS



C. W. SHERMAN

FRANK A. SHERMAN

THE LAST *DROP* IS AS GOOD AS THE FIRST

Ask the Men Who Use It!

YEP... FLEAS AND "BUGS" ARE TROUBLESOME!

... and not only that, but EXPENSIVE, when it comes to accuracy in casting! DAYTON OIL is doing a job! It will take the "bugs" out of your core room troubles. If you're not using this better oil, maybe you're overlooking a real bet. Let the DAYTON OIL service man tell you more about this UNIFORM, dependable quality oil.

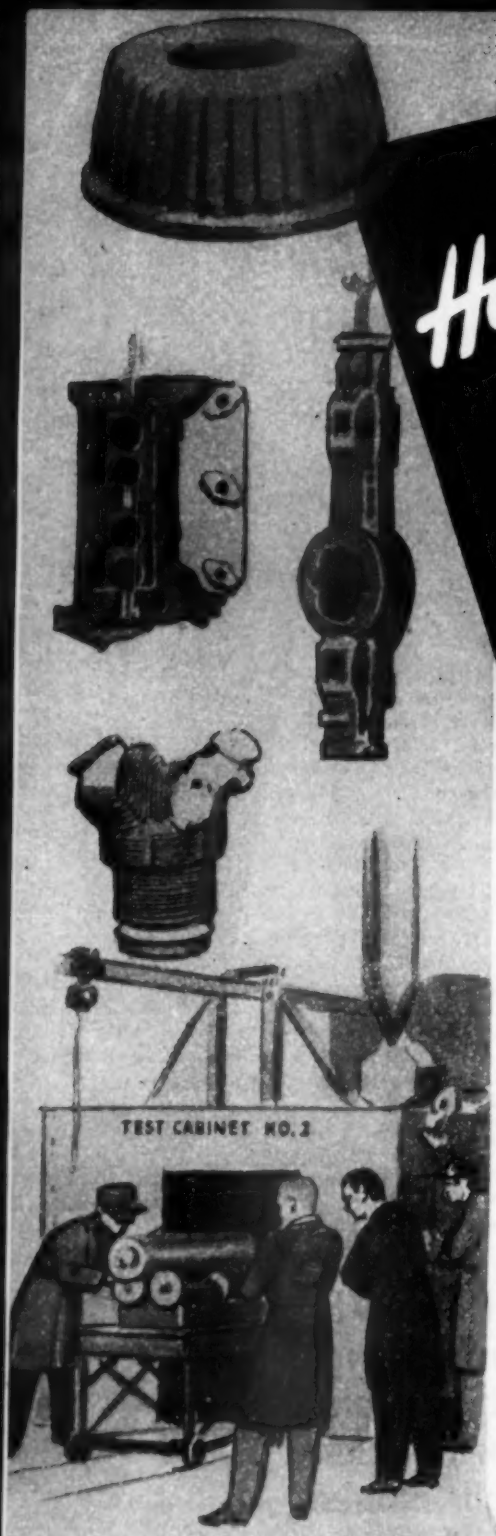
The

DAYTON OIL COMPANY

DAYTON 1, OHIO

STEEL CORE AND MOLD WASHES - BINDER AND CORE PASTE - CORE WASHES - CHILL COATINGS

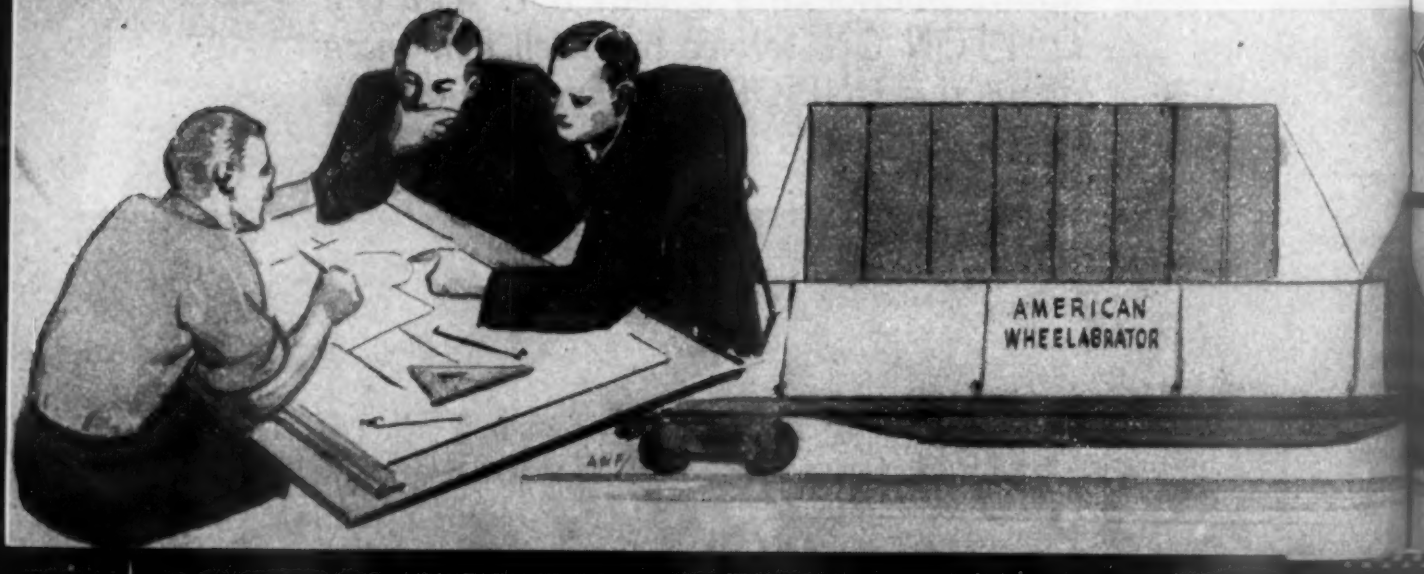
How WHEELABRATOR ENGINEERS Are Helping Foundries Solve Difficult Cleaning Problems



IF you have never had an opportunity to investigate the airless Wheelabrator or talk to any of its users—now numbering over 2500—about the unusual savings it effects, the speed of its production, and the perfection of its cleaning action, there is a real eye-opening experience in store for you.

Case histories of typical Wheelabrator installations are outlined on the next page. If you are looking for results like these, let us give you tangible evidence and further facts about Wheelabrator's brilliant performance record. Then test it on your own work—we can do this for you in a machine located nearby or in our own demonstration department.

Now is the time to get set with a fast-producing, cost-reducing Wheelabrator to meet competition on a better than equal footing. Write us about your problems today, won't you?



$7,270.05 SAVED ANNUALLY

● A large Eastern company replaced three 8′ airblast table machines with a No. 2 Wheelabrator Multi-Table. Only one man is now required to load, unload and operate the machine. Direct cleaning costs have been lowered 45.9%. Resultant savings amount to $7,270.05 annually.

3200 LBS. OF CASTINGS CLEANED HOURLY IN SMALL TUMBLAST

● 3200 pounds of gray iron castings, ranging in size from one pound to 50 pounds are cleaned in one hour in a 27 x 36″ Wheelabrator Tumblast at the Blue Valley Foundry Co., Kansas City, Missouri. Average cleaning time per load of 400 pounds is only three minutes.

After the machine had been in operation less than a week, Mr. J. T. Westwood, stated: "Our cleaning room was always piled up with castings from day to day before we purchased the Wheelabrator Tumblast; now it looks like we're holding open house every afternoon the place is so clean".

ONE MAN NOW DOES WORK OF SIX

● Prior to the installation of a Wheelabrator Tumblast, the Texas Steel Co., Fort Worth, Texas, was operating its sand blast room seven days a week, twenty four hours a day to handle cleaning room requirements. Six sand-blast operators were needed. Since the Wheelabrator Tumblast has taken over, the sand blast room, using a single operator, handles only castings too large to be cleaned in the Tumblast. All other castings are Wheel-abrated in eight hours' time.

SWING TABLE HANDLES ENTIRE PRODUCTION

● The 66″ Wheelabrator Swing Table at Union Iron Works, Decatur, Illinois, cleans a table load of gray iron castings in from 3 to 8 minutes depending upon the size and type of pieces. Practically every casting made in their plant can be handled on this table.

PRODUCTION UPPED 2300%

● Forty brass discs, about 2″ thick and 6″ in diameter are cleaned in five minutes in a small 20 x 27″ Wheelabrator Tumblast at the Tri-Boro Brass Co., Bronx, New York. With airblast equipment, three minutes were required to clean *each* casting.

SPECIAL CABINET CLEANS LARGE TONNAGE OF COMPLICATED CASTINGS

● 29,780 lbs. of diesel motor blocks, frames, end rolls, etc. are cleaned in less than five hours with a Wheel-abrator Monorail Cabinet at a Pennsylvania manu-facturing plant. Approximately 750 pounds of castings are hung on each hook which is indexed for three minutes before each of the three Wheelabrator units.

CLEANING TIME CUT FROM 30 MIN. TO 6 MIN.

● The chief engineer at a Wisconsin Malleable foundry is well pleased with their 48 x 72″ Wheelabrator Tum-blast—and rightfully so as you can see by these brief facts:

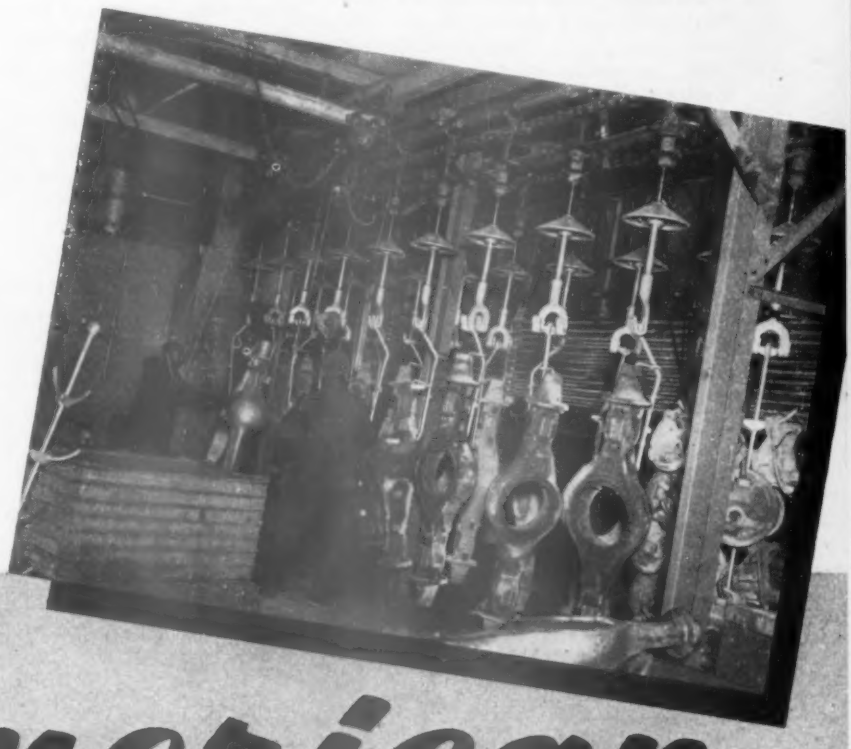
Tonnage: Wheelabrator handles 100% more tonnage per load than the sand blast barrel which it replaced.

Time: Wheelabrator's cleaning time averages 6 minutes per load as against 30 to 45 minutes per load with the former sand blast barrel.

Rejects: Whereas rejects in the cleaning department had formerly run as high as 30%, they are now completely eliminated.

15,500 LBS. OF GEARS AND SPROCKETS CLEANED HOURLY ON 2 TABLES

● A large farm equipment manufacturer uses two No. 2 Wheelabrator Multi-Tables. One machine is used for cleaning heat-treated tractor bull gears weighing 70 to 80 lbs. apiece. It is cleaning about 8,000 lbs. of gears per hour. The other machine cleans sprockets, weighing 200 to 250 lbs. apiece, at the rate of one every two minutes. Over 7500 lbs. of this work are cleaned hourly.



ARMY E NAVY

THE AMERICAN WHEELABRATOR TRADE MARK REG. U. S. PAT. OFF.

American

FOUNDRY EQUIPMENT CO.

505 S. BYRKIT ST. MISHAWAKA, INDIANA

WORLD'S LARGEST BUILDERS OF
AIRLESS ABRASIVE BLAST EQUIPMENT

(*Continued from page* 118)

stein. Just before the German invasion he escaped to Roumania and was foundry manager for the Vulcan Foundry until April, 1940, when he went to Paris and worked as a mechanical engineer for the Engineering Society of France. With the fall of France he went to Brazil and was assistant superintendent of the foundry of Elevadores Atlas, Sao Paulo, the principal elevator and lift manufacturer in South America. In July, 1944, Mr. Zimnawoda came to the United States and joined the American Steel Casting Co., where he was assistant plant engineer until February 1945.

♦ ♦ ♦

N. J. Kelly, recently elected president of the Pittsburgh Foundrymen's Association, is president, Kelly Foundry Co., Pittsburgh, a gray iron foundry which was founded by his grandfather and subsequently was operated by his father. Mr. Kelly has been with the company 33 years. He attended Duquesne University and the old Pittsburgh Academy where he studied engineering. An active member of the Pittsburgh Foundrymen's Association, he was vice president during the past year.

♦ ♦ ♦

Warner A. Wick, formerly assistant to the vice president, Falcon Bronze Co., Youngstown, O., has been appointed assistant manager in charge of production. Before joining the company in 1943, Mr. Wick taught at the University of Chicago, Dartmouth and Central Colleges. After graduation from Williams College in 1932, he was awarded a scholarship to Exeter College, Oxford, where he won first honors in philosophy. He received a fellowship from University of Chicago, and a Ph.D in philosophy in 1941.

♦ ♦ ♦

T. C. Watts, director and former superintendent at Falcon, has been appointed assistant manager in charge of personnel and supplies. **J. C. Lopatta,** formerly general foreman, has been appointed foundry superintendent.

♦ ♦ ♦

H. Thomas Cahraman has joined the sales office of Reynolds Metals Co., Bridgeport, Conn., in charge of the aluminum division. Mr. Cahraman, a native of Yonkers, N. Y., was formerly manager of the sub-contract department, Federal Telephone & Radio Co., Newark, N. J., and was sales manager of the Edgewater, N. J. branch of Ford Motor Co., at one time.

LEON BRISTOL
Who has been appointed eastern representative for E. J. Woodison Co., Detroit, as reported in THE FOUNDRY for June.

♦ ♦ ♦

Victor R. Willoughby, vice president and director of research and development, American Car & Foundry Co., New York, is retiring after an association with the company of almost 50 years.

♦ ♦ ♦

John W. Perry Jr., vice president, Grede Foundries Inc., Milwaukee, has been appointed to the terms of sale committee of the Gray Iron Founders Society.

♦ ♦ ♦

G. P. Vincent, manager of the sales development and technical service department the Mathieson Alkali Works, has been appointed to the newly created position of technical director. In addition to his former duties, Mr. Vincent will direct research and technical development and advise on technical matters concerning plant operation. He succeeds **R. E. Gage,** who was director of research and development for 14 years and who has been appointed technical advisor of the company.

♦ ♦ ♦

Armin G. Kessler has been appointed manager of sales of the midwestern district, Farrel-Birmingham Co. Inc., Ansonia, Conn., with headquarters in Akron, O. Mr. Kessler joined Farrel-Birmingham in 1920 as general manager of the Buffalo plant. He has been a vice president and director of the company since 1923, and prior to his recent appointment, was general works manager of the Ansonia, Derby, Conn., and Buffalo plants. A graduate of Cornell University, Mr. Kessler was a lieutenant USNRF, in the first World War, and later became assistant chief, Gun Division, U. S. Navy Ordnance Department, Washington. He left the Navy in 1919 and was vice president of General Ordnance Co., Derby, Conn.

♦ ♦ ♦

J. C. Schaefer, field engineer of the Allis-Chalmers Mfg. Co.'s Pittsburgh district office, has been appointed branch office manager at Youngstown, succeeding **E. H. Legler,** who has been transferred to the electrical department at Milwaukee. **L. E. Stacey,** field engineer of the Pittsburgh district office, has been transferred to Wheeling, W. Va., as resident field engineer.

♦ ♦ ♦

F. W. Stanton has been appointed plant engineer, Duraloy Co., Scottdale, Pa. Until recently Mr. Stanton was master mechanic, Pittsburgh Metallurgical Co., Niagara Falls, N. Y., and prior to that was associated with Allegheny-Ludlum Steel Co., Buffalo, and Tonawanda Iron Corp., North Tonawanda, N. Y.

♦ ♦ ♦

Gordon S. Gillespie has been appointed comptroller and secretary of Adel Precision Products Corp., Burbank, Calif. Mr. Gillespie had been secretary-treasurer Diamond Iron Works Inc., and Mah

(*Continued on page* 124)

N. J. KELLY

J. C. LOPATTA

WARNER A. WICK

T. C. WATTS

FOR YOUR TOUGHEST MATERIALS HANDLING JOBS . . . SPECIFY THE NEW

PHILCO "THIRTY"

-with 30% Longer Life!

The tougher the jobs, the better this new Philco "Thirty" Storage Battery shows up. For long ramps and heavy loads — Philco "Thirty" delivers the power. And — in addition — it gives 30% longer life! Write today for the new Philco "Thirty" catalog.

The new Philco "Thirty" for electric industrial trucks is identified by its distinctive red connectors.

PHILCO CORPORATION
STORAGE BATTERY DIVISION
TRENTON 7, NEW JERSEY

FOR 50 YEARS A LEADER IN INDUSTRIAL STORAGE BATTERY DEVELOPMENT

(*Concluded from page* 122)

Mfg. Division, Minneapolis, for the past 7 years. Previously he spent 16 years as auditor and staff accountant, Stone & Webster Service Corp., Boston and New York.

♦ ♦ ♦

After an association of 54 years, **Miss M. Seitz** is retiring from the Joseph Dixon Crucible Co., Jersey City, N. J. Many of her years were spent in the crucible and refractory sales division, of which she was an executive. In her honor a dinner was given in Jersey City, May 25, by her associates in the Joseph Dixon Crucible Co.

♦ ♦ ♦

Robert Wier, Jr., has been appointed general sales manager of the brush division, Osborn Mfg. Co., Cleveland. Mr. Wier was formerly sales manager, Western Cartridge Co., with headquarters at the Winchester Repeating Arms Co. division, New Haven, Conn.

♦ ♦ ♦

Harry C. Wanner, until recently president, Headford Bros. & Hitchins Foundry Co., Waterloo, Iowa, has been appointed general manager, Midwestern Magnesium Co., Garrett, Ind.

♦ ♦ ♦

Raymond E. Birch has been appointed director of research, Harbison-Walker Refractories Co., Pittsburgh, to succeed the late **Fred A. Harvey.** Mr. Birch, who has been associated with the company since 1930, was graduated from Ohio State University in 1927 and received the professional degree of ceramic engineer in 1937.

♦ ♦ ♦

Max Schlossberg, for the past ten years vice president, M. S. Kaplan Co., Chicago, and Harold Brady, formerly a partner in the Brady Co., Rock Island, Ill., and associates, have established the Max Schlossberg Co., 33 North LaSalle street, Chicago, to deal in iron and steel, alloy and stainless scrap.

♦ ♦ ♦

Herbert L. Mausk has been appointed manager of railway sales, National Malleable & Steel Castings Co., Cleveland. **George R. Farrell** has been appointed to succeed Mr. Mausk as Cleveland district sales manager. The Cleveland territory will be extended to include the Pittsburgh district.

♦ ♦ ♦

Eli Merkle, recently appointed foundry superintendent, Shepard Elevator Co., Cincinnati, entered the foundry industry as an apprentice coremaker at the J. H. Day Foundry in 1907, later becoming core room foreman, Elmwood Castings Co., and superintendent, Blackburn Foundry Co., all of Cincinnati. Mr. Merkle joined Shepard Elevator Co. in 1937, and until his recent appointment was foundry foreman.

♦ ♦ ♦

Elmer J. Steger, manager of the pneumatic tool and appliances division, Cleveland Pneumatic Tool Co., has also been appointed manager of the rock drill division. Mr. Steger is executive vice president and treasurer of the company's Canadian subsidiary, Cleveland Pneumatic Tool Co. of Canada Ltd. **Charles E. Vanderpool,** formerly assistant manager of the pneumatic tool division, has been made sales manager. **Albert H. Hruby,** in charge of contract termination, has been appointed sales manager of the rock drill division, and **Robert Craig,** formerly district manager at Salt Lake City, has been named manager of export sales.

♦ ♦ ♦

Alvin Dice, vice president in charge of production, Albion Malleable Iron Co., Albion, Mich., retired June 1. He will continue as a member of the company's board of directors.

♦ ♦ ♦

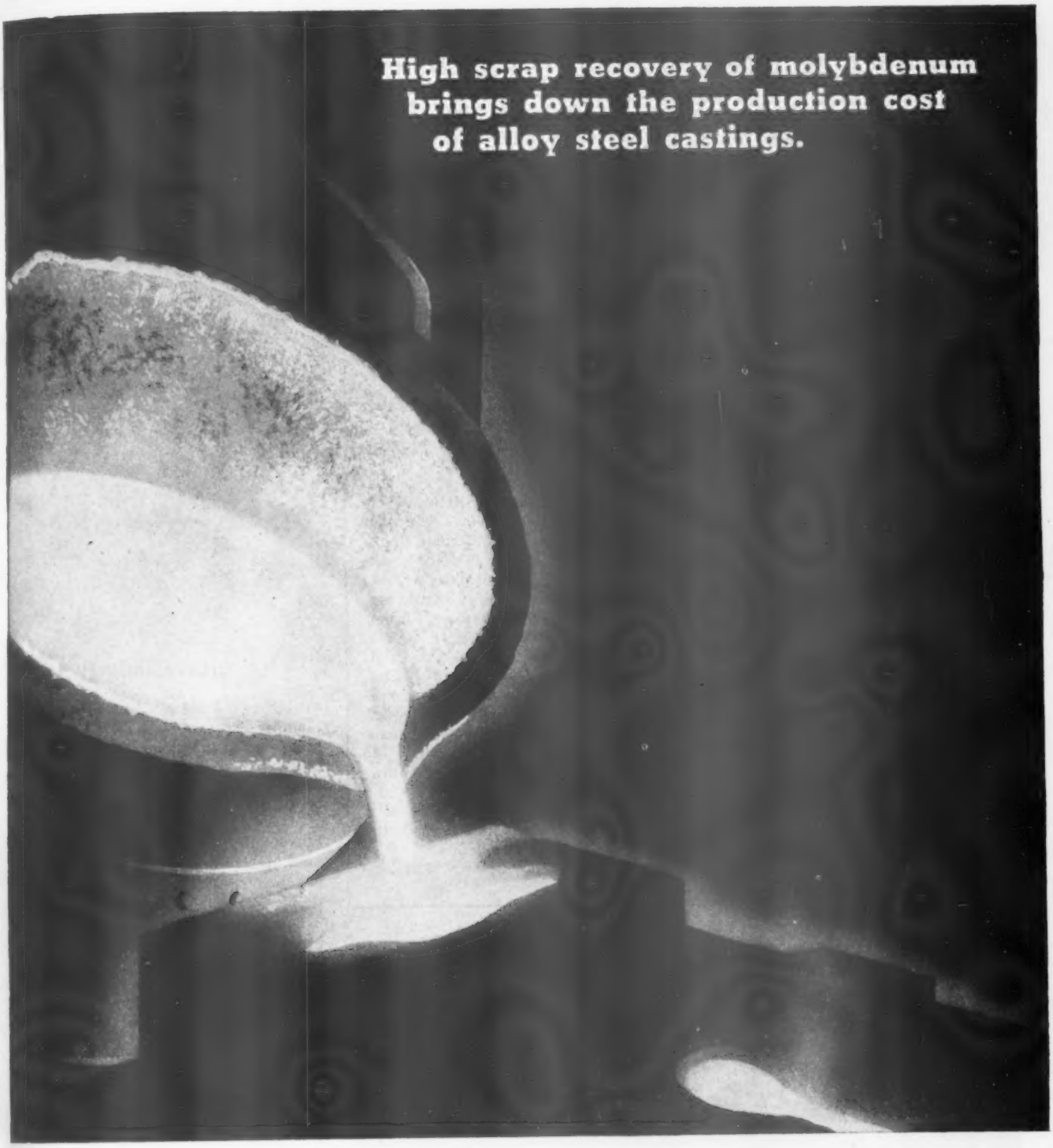
Lawrence C. Miller, formerly assistant treasurer, has been elected treasurer, Vanadium Corp. of America, New York.

♦ ♦ ♦

Harry D. Wagner has joined the staff of engineers attached to the Cleveland office of the Foxboro Co., Foxboro, Mass.

PRESENTATION OF AWARDS AT STEEL FOUNDERS' ANNUAL MEETING

Reports of officers and the honoring of three members for outstanding contributions to the industry featured the annual business meeting of the Steel Founders' Society of America at Chicago, May 18. The accompanying illustrations show A. M. Andorn, Penn Steel Castings Co., Chester, Pa., and president of the Steel Founders' Society, presenting the Technical and Operating Medal to Edwin A. Walcher, vice president, Ohio Steel Foundry Co., Lima, O. (below); the Frederick A. Lorenz Memorial Medal to Claude L. Harrell, vice president, Sterling Steel Casting Co., St. Louis (lower right); and illuminated resolutions of the board of directors to Oliver E. Mount, vice president, American Steel Foundries, Chicago.



CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

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MOLY

Victory in Europe

UNLIKE the armistice which saw the end of the last war, VE-Day came as no surprise. The wehrmacht has been well and truly beaten. The Navies, Armies and Air Forces of the Allies have by much sacrifice and sheer hard work gained complete ascendancy over their enemies. Supporting these efforts was the dull, unceasing, arduous toil of industry, kept in motion and supplied with essential raw materials by thousands of foundries located in and thousands of miles away from the front line. Several London Foundries have become total casualties, whilst others still carry their first-aid bandages.

It is fitting that we should pay a high tribute to the directors, managers, foremen and operatives of Britain's basic industry for the almost superhuman effort they have made towards making this victory possible. Long hours in ill-ventilated Zep-lighted foundries, prolonged by duties as home guards, fire watchers or wardens, made heavy calls on their endurance. Not a few were unable to withstand the strain and their loss is mourned alongside with the Service casualties. Yet despite the calls of work and auxiliary war work, the urge for improving technical knowledge seems to have been stimulated. We were flattered—not insulted—when during lecture engagements two or three members of the audience failed to keep awake. They were equalled in stature by the sentry in Drinkwater's play, "Abraham Lincoln." Again, other meetings have been but slightly disturbed but not dispersed by the nerve-wracking crescendo of an approaching rocket or the crash of a high-explosive bomb.

Now this same group of individuals has to face up to this brave new world. Already disagreements as to future policy have disrupted directorates, and caused prominent executives to hand in their resignations. It is easily understandable, as too close association for too long a time under conditions of excessive pressure of work tends to widen differences of opinion. Normally, a short holiday provides the necessary healing balm. However, a short game of industrial "musical chairs" may be beneficial in the change-over period.

What of the foundry industry of Germany? It is obvious that the major installations of Berlin, Hamburg, Cologne, and the other great cities are ruined, but of all industries, the jobbing foundry is possibly the easiest and quickest to re-equip. From the debris one can salvage a cupola here, a sand mill there, a crane and some ladles elsewhere. Herein will be the rebirth of German industry, and if the occupation authorities are wise they will control the economic future of Germany by a strict supervision of the order-books of such concerns. Without castings there can be no rehabilitation of the metallurgical and chemical industries, whilst the growth of others can be controlled.

Foundry Trade Journal, London

MAGNESIUM MEETING: *Officials of the Magnesium Association, shown left to right at the organization's May 15 meeting held in New York, are: Edward S. Christiansen, Magnesium Co. of America Inc., president of the association; Edward W. Rouse, Revere Copper & Brass Inc., chairman of the Magnesium Development Committee; Ralph J. Mowry, White Metal Rolling & Stamping Corp., and T. W. Atkins, executive vice president of the association*

Establishes Foundry Consulting Firm

Lester B. Knight & Associates, 120 South LaSalle street, Chicago, announce a new consulting and engineering service, specializing in foundry problems. The organization offers an engineering service for plant surveys, modernization and mechanization, and consultation in problems of management, sales and production.

Lester B. Knight, who heads the organization, has been associated with the foundry industry since 1925, when he

LESTER B. KNIGHT

worked at the old Abendroth Bros. Stove Foundry, Port Chester, N. Y. In 1927, he joined the Bethlehem Steel Co., Bethlehem, Pa., where he supervised sand control in the steel, gray iron, ingot mold, roll and bronze foundries. While at Cornell University, he worked with Dr. H. Ries on much of the synthetic sand research work being developed under sponsorship of the A.F.A. at that time.

Upon graduation from Cornell in 1929, Mr. Knight became associated with Illinois Clay Products Co., Chicago, as a sales engineer and devoted one year to installation of synthetic sand practice in all classes of foundries. In 1930, Mr. Knight joined the National Engineering Company as sales engineer, and successively became sales manager and vice president.

The Bureau of Ships of the Navy Department called Mr. Knight to Washington early in 1943 as a lieutenant commander to assist in the completion of its foundry and forge program. The Bureau of Ships sponsored some 50 or more foundry and forge projects to be privately operated. While serving in the Navy, Mr. Knight also inaugurated a program of modernization of navy yard foundries. During the last seven months of his service in the Navy, he was a member of the Industrial Survey Division, which conducted industrial engineering surveys of the East coast navy yards, reporting to the Secretary of the Navy.

Mr. Knight has been an active member of A.F.A. and has presented many papers on sand preparation, foundry modernization, and good housekeeping.

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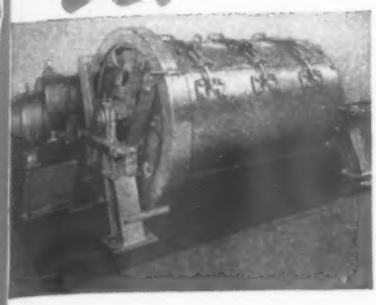

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2. Special door locks — easily operated.
3. Extra heavy gearhead motor.
4. Integral motor platform.
5. Loading and unloading from either side.

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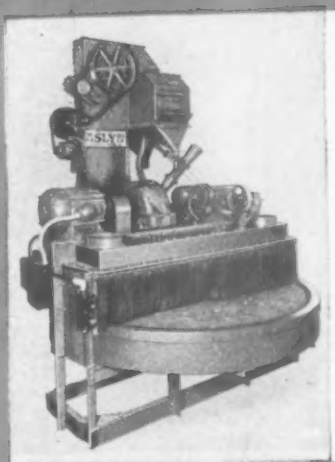

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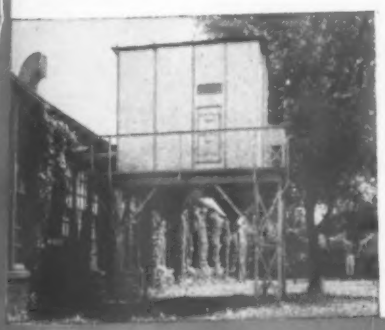

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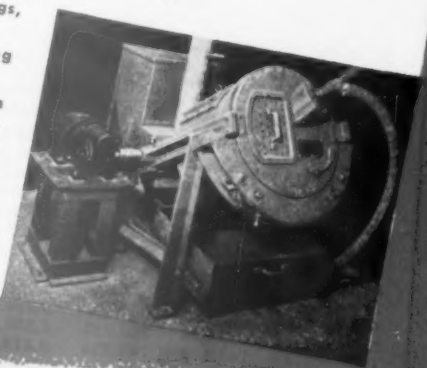

70 YEARS OF SERVICE TO THE FOUNDRY INDUSTRY

THE W. W. SLY MANUFACTURING CO.

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Foundry Statistics

Malleable Iron Castings

	Production (Tons)			New Net Orders (Tons)		
	1945	1944	1943	1945	1944	1943
Jan.	83,742	75,594	63,572	97,153	93,855	73,524
Feb.	78,385	74,812	66,401	79,913	79,352	87,728
Mar.	86,175	81,480	78,143	98,979	90,038	85,744
Apr.	77,042	69,820	72,559	78,075	88,169	74,241
May	.....	70,555	69,959	.....	92,285	77,768
June	.....	70,993	69,111	.....	103,692	78,289
July	.....	61,320	66,011	.....	106,626	91,653
Aug.	.....	74,297	67,615	.....	71,307	108,505
Sept.	.....	74,628	74,874	.....	49,502	99,911
Oct.	.....	80,505	74,254	.....	76,536	101,510
Nov.	.....	79,629	72,077	.....	48,149	93,370
Dec.	.....	76,187	75,188	.....	69,972	81,978
Total	.....	889,820	849,764	.....	969,483	1,064,224

Steel Castings

	Shipments (Tons)		Production (Tons)		New Net Orders (Tons)	
	1945	1944	1945	1944	1945	1944
Jan.	201,162	237,570	157,176	159,795	210,182	167,739
Feb.	186,364	211,958	146,165	161,359	214,408	173,592
Mar.	211,890	224,913	166,896	174,626	203,170	162,575
Apr.	.....	204,279	.....	155,778	.....	175,053
May	.....	210,360	.....	161,783	.....	176,993
June	.....	200,237	.....	157,444	.....	181,816
July	.....	176,735	.....	131,940	.....	169,921
Aug.	.....	204,833	.....	154,911	.....	171,309
Sept.	.....	189,443	.....	144,458	.....	129,847
Oct.	.....	197,772	.....	150,719	.....	146,116
Nov.	.....	196,475	.....	146,411	.....	120,667
Dec.	.....	190,846	.....	144,162	.....	138,666
Total	.....	2,435,421	.....	1,843,386	.....	1,914,294

Note: Shipments for sale and own use; production and orders for sale only.

Aluminum Casting Shipments

(In millions of pounds)

	Total	Sand	Perm. Mold	Die
1943	459.5	304.2	89.6	65.7
Jan.	33.1	21.9	6.4	4.8
Feb.	33.3	22.0	6.5	4.8
Mar.	38.7	25.3	7.9	5.5
Apr.	37.1	24.3	7.6	5.2
May	37.7	25.0	7.7	5.0
June	36.3	24.1	6.9	5.3
July	37.2	24.7	7.1	5.4
Aug.	38.2	25.4	7.2	5.6
Sept.	40.8	27.2	7.9	5.7
Oct.	42.7	28.5	8.0	6.2
Nov.	43.0	28.5	8.3	6.2
Dec.	41.4	27.3	8.1	6.0
1944	514.5	321.1	106.3	84.2
Jan.	44.1	29.4	8.3	6.4
Feb.	45.9	30.2	8.0	7.5
Mar.	49.5	31.4	9.6	8.1
Apr.	42.9	27.0	8.3	7.3
May	44.7	27.9	8.9	7.5
June	42.4	25.9	8.8	7.4
July	38.7	24.5	7.7	6.2
Aug.	43.2	26.9	9.2	6.9
Sept.	41.5	25.5	8.9	6.9
Oct.	42.1	25.1	9.8	7.0
Nov.	40.5	24.3	9.6	6.4
Dec.	39.0	23.0	9.2	6.6
1945				
Jan.	43.5	25.3	10.6	7.3
Feb.	42.0	24.9	9.7	7.2
Mar.	48.2	27.7	12.2	8.1

Foundry Equipment, Supplies

(In thousands of dollars)

	Shipments	Orders	Back-logs
1943	53,806	32,094	.....
Jan.	4,949	2,788	18,759
Feb.	4,953	2,551	16,535
Mar.	5,863	2,913	14,899
Apr.	5,365	2,676	12,904
May	4,718	1,774	10,513
June	4,825	2,319	9,017
July	4,017	2,405	8,345
Aug.	3,513	1,989	7,429
Sept.	3,881	2,070	6,930
Oct.	3,792	3,401	7,092
Nov.	3,563	3,422	7,076
Dec.	3,217	3,786	7,731
1944	41,914	44,903	.....
Jan.	3,336	3,515	7,910
Feb.	3,426	4,338	8,822
Mar.	3,679	4,370	9,513
Apr.	3,496	2,424	8,441
May	3,547	4,089	8,983
June	3,554	3,906	9,335
July	3,027	3,086	9,394
Aug.	3,818	4,115	9,691
Sept.	3,445	3,465	9,711
Oct.	3,758	4,293	10,246
Nov.	3,451	3,401	10,196
Dec.	3,377	3,912	10,731
1945			
Jan.	3,355	3,631	11,007
Feb.	3,548	4,103	11,562
Mar.	3,804	5,247	13,005

Magnesium Casting Shipments

(In thousands of pounds)

	Total	Sand	Perm. Mold	Die
1943	65,967	59,123	3,978	2,866
Jan.	4,376	3,934	253	189
Feb.	4,445	3,931	299	215
Mar.	5,364	4,802	300	262
Apr.	5,237	4,694	284	259
May	5,263	4,652	343	268
June	4,690	4,159	296	235
July	4,940	4,406	290	244
Aug.	5,238	4,770	257	211
Sept.	6,008	5,391	390	227
Oct.	6,774	6,096	431	247
Nov.	6,792	6,088	452	272
Dec.	6,840	6,220	382	238
1944	83,979	75,221	6,396	2,362
Jan.	6,984	6,210	536	238
Feb.	7,293	6,603	469	221
Mar.	8,242	7,574	496	172
Apr.	7,520	6,922	413	185
May	7,357	6,664	514	179
June	6,535	5,729	598	208
July	6,481	5,653	656	172
Aug.	6,934	6,143	563	228
Sept.	6,945	6,147	606	192
Oct.	6,738	6,062	515	161
Nov.	6,639	5,919	521	199
Dec.	6,315	5,595	509	207
1945				
Jan.	7,005	6,149	609	247
Feb.	6,707	5,832	658	217
Mar.	7,664	6,700	683	281

GRAY IRON CASTINGS—Production, Shipments and Unfilled Orders

Monthly Totals

(Tons)

1944	Production	Shipments	Unfilled Orders
Jan.	793,884	765,423	2,259,158
Feb.	772,764	764,369	2,145,027
March	840,890	828,648	2,184,268
April	765,784	757,880	2,159,280
May	789,007	790,674	2,204,572
June	765,581	763,459	2,218,183
July	698,418	689,744	2,313,645
Aug.	778,388	778,205	2,335,194
Sept.	768,661	744,954	2,304,323
Oct.	788,196	780,453	2,296,690
Nov.	769,734	760,383	2,300,350
Dec.	743,710	741,534	2,474,548
Totals	9,275,017	9,165,726	.....
1945			
Jan.	807,130	791,395	2,496,928
Feb.	752,935	752,266	2,562,076
Mar.	850,653	857,616	2,713,656

By Type—Latest Months Reported

	Production	Shipments Total	Shipments For Sale	Unfilled Orders Total	Unfilled Orders For Sale	Unfilled Orders For Own Use
March, 1945						
Total	850,653	857,616	537,305	2,713,656	1,904,419	809,237
Cast iron pressure pipe	52,116	53,290	50,201	164,802	159,109	5,693
Cast iron soil pipe	15,729	17,226	17,226	137,256	137,256	.....
Chilled car wheels	88,153	93,101	85,073	242,219	226,205	16,014
Molds for steel ingots	181,020	185,471	91,898	384,206	224,337	139,869
All other gray iron	513,635	508,528	292,907	1,785,173	1,137,512	647,661
February, 1945						
Total	752,935	752,266	464,858	2,562,076	1,804,207	757,869
Cast iron pressure pipe	43,595	40,039	37,542	153,629	148,336	5,293
Cast iron soil pipe	15,254	15,816	15,816	121,287	121,287	.....
Chilled car wheels	74,211	84,121	77,257	232,594	212,793	19,801
Molds for steel ingots	161,675	161,127	75,263	357,269	221,085	136,184
All other gray iron	458,200	451,163	258,980	1,697,297	1,100,706	596,591

WPB figures reported by Bureau of the Census

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In addition, Bay State Portable Snagging Wheels give you an exclusive safety feature ... and Bay State's dual-purpose wheels for floor stand and swing frame use, provide a "wheel within a wheel", suited on outer diameters for high speed floor stand snagging, and when reduced in diameter, for the generally more severe swing frame work.

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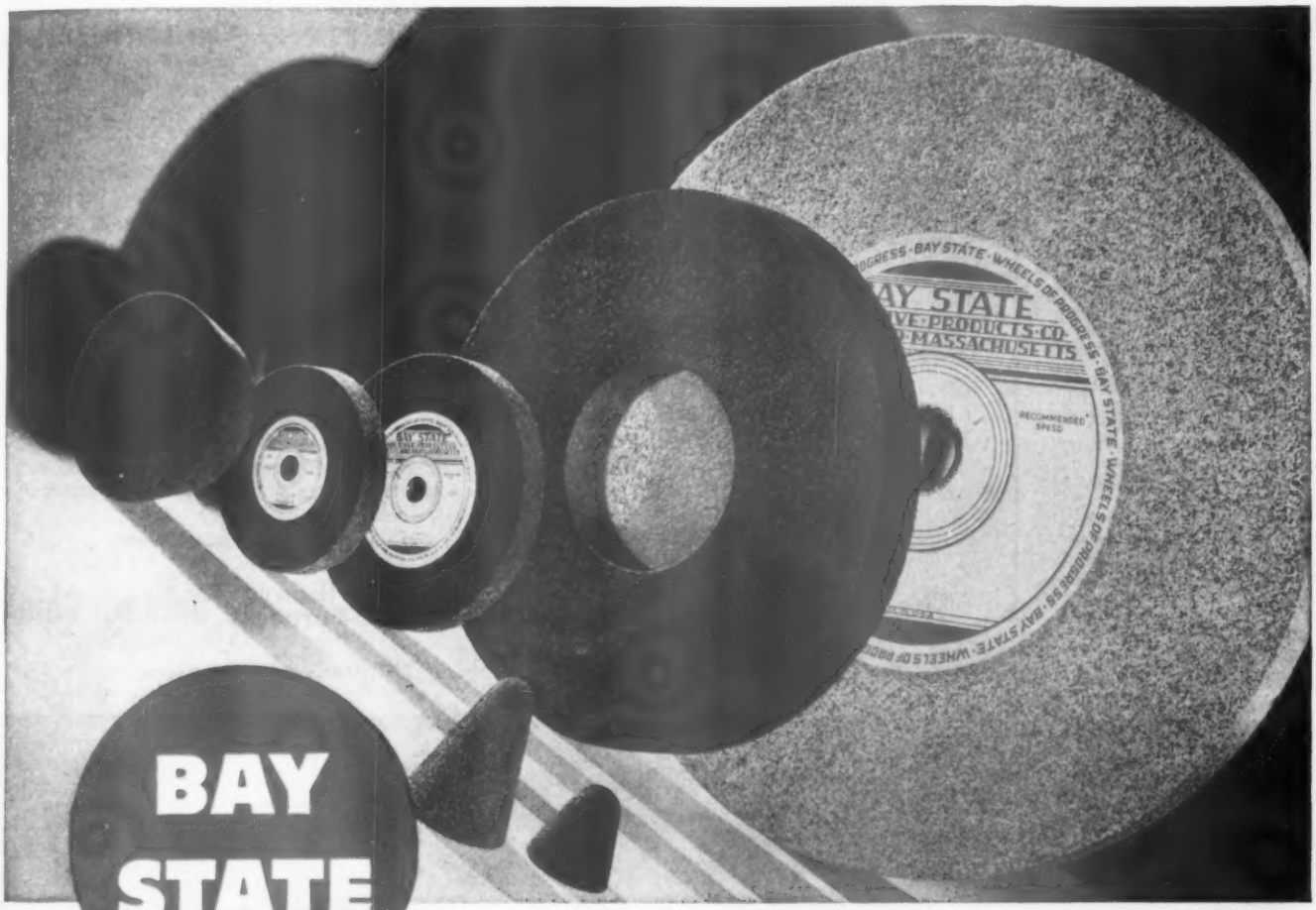

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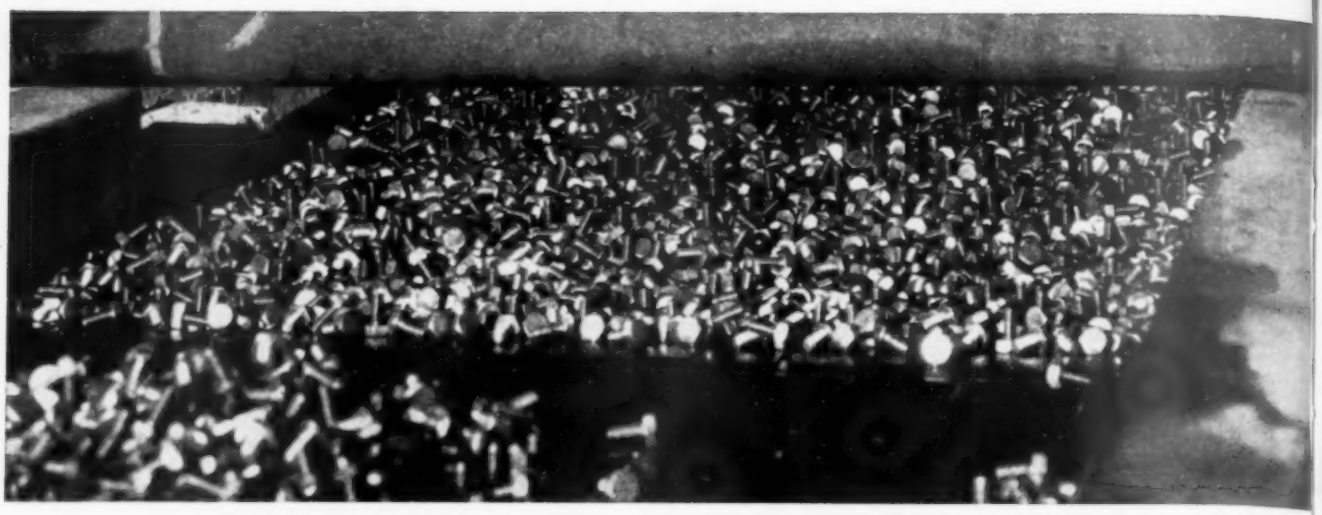

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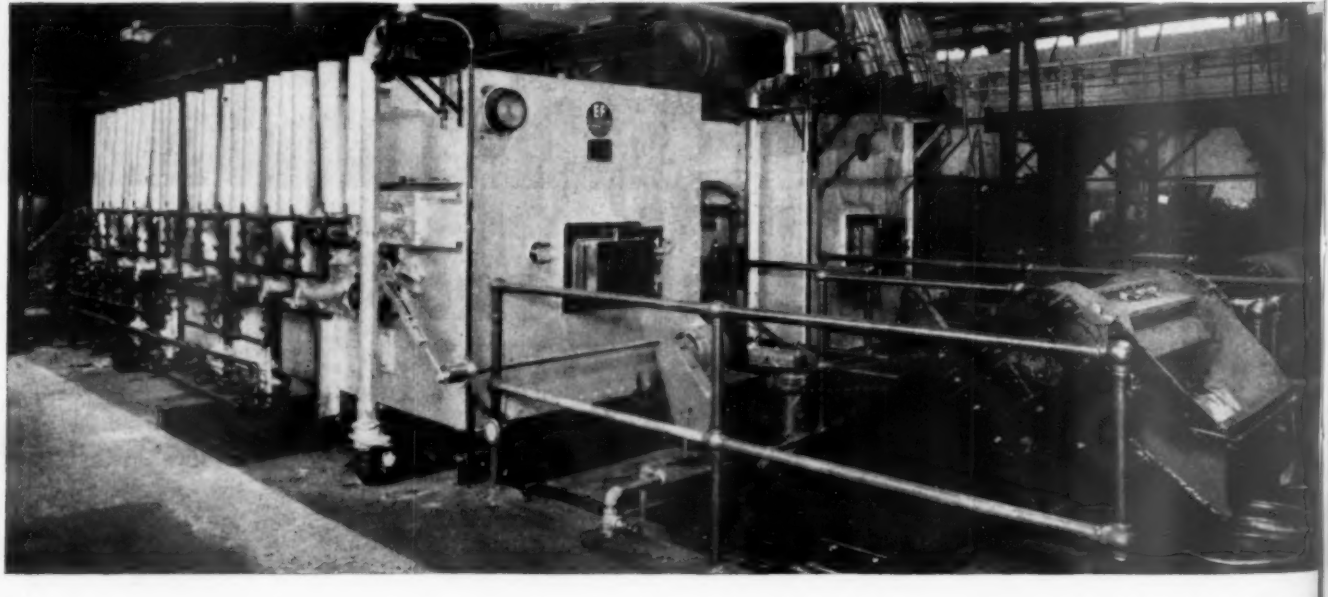


Around DETROIT

BY A. H. ALLEN
Detroit Editor, The Foundry

Experimental trend is toward increased use of castings in motor car engines . . . Seek precision product that will eliminate many costly and tedious machining operations . . . . . .

OUT in the experimental engine laboratories of the Ford Motor Co. there is reputed to be on test a newly designed power plant of which every single component is a casting—cylinder block, head, crankcase, crankshaft, camshaft, connecting rods, valves, tappets, pistons, manifolds, pumps, etc. Knowing the partiality of Ford metallurgists and engineers for castings, the report is entirely credible, and suggests that research and testing are still pointed in the direction of adapting more castings to engine designs. From the time when C. E. Sorenson first had anything to do with Ford production, the emphasis on cast parts has been strong, and of all the automotive manufacturers, Ford has made the greatest strides toward improving and extending cast iron and cast steel. There is no reason to assume this trend will change as automotive production and assembly lines once again begin to take on their characteristic form and activities.

Reduce Machining Cost

One of the objectives in further application of castings in passenger car engines is the reduction in amount of machining necessary. This may sound anomalous when it is recalled how many former gray iron castings had to be turned, milled, drilled and ground to finished dimensions, but the answer is that in the newer castings, strenuous efforts are being made to produce a precision product in the casting itself, then perhaps finishing by shotblasting and hot coining in a press to final size, eliminating tedious machining operations which, in view of high labor costs, push the cost of finished castings well beyond what they used to be.

The combination of a precision-type iron or steel casting with hot coining is a relatively new technique in this country, although it has been practiced in Germany for some time, both on ferrous castings and light metal alloys. Still more or less experimental, there is a good chance the method may find early production application.

Lessons learned in the process of investment castings by the lost wax process, with which Ford and other companies have been toying, may prove translatable into improved casting techniques for long-run automotive castings, although it is too early to tell clearly just how. Ford's work in centrifugal casting of chrome-molybdenum steel for main landing gear pivots on the B-24 bombers built at Willow Run certainly should be productive of worthwhile ideas for automotive castings. The same process has even been applied to production of tubing for arc welded assemblies at the time rolled tubing was short.

Another interesting casting development originating among Ford technicians is the production of a permanent mold piston casting which is subsequently given a pressing or coining treatment so that the only final machining necessary is a light pass on a centerless grinder. Other aluminum castings, a number of which have been used on the B-24 bomber, in recent months have been changed to a 5 per cent zinc alloy, AN-A-17, which does not require heat treatment and straightening thereafter, thereby increasing the foundry yield.

Saginaw Malleable Division of General Motors likewise is probing into the future possibilities of its pearlitic malleable iron, or Armasteel as it is called, for automotive applications. A recent development which has come to the attention of metallurgists is a connecting rod casting which is given the usual shotblasting, anneal and finally a hot coining to size. Virtually no machining is required on the rod except for the bearing surfaces.

The pressure on costs of automotive parts is going to be appreciable and this in turn is going to mean pressures on engineers and metallurgists to devise methods and processes which will permit savings. It is not so much a matter of one material versus another one process against another, as it is selection of a material and method which will give the required properties at the right price. If castings can do this, then it will be castings: if welded stampings can do it, they will get the nod. This simply means it is up to foundrymen and their engineering staffs to examine closely all the possibilities for cost reductions which their products may offer—and to keep on examining them.

Packard in Low Gear

Packard's gray iron foundry still is operating at low throttle, running two cupolas on a 10-hour day producing about 120 tons. This is far from the normal pace of automotive days, but production can be raised at a moment's notice when orders are released from the front office. At present no production has been started for new passenger cars, but with first shipments of parts on the 1946 models scheduled for July 1, foundry operations may be accelerated by the time this appears in print.

Experiments are being conducted in reclaiming used core sand for barrel cores in cylinder blocks. This was readily possible when Packard was producing aluminum castings, and an $80,000 Link-Belt installation was purchased for sand reclaiming. However, in gray iron casting, where temperatures are around 2650 instead of 1380 degrees, the problem is more complex. If too large a proportion of reclaim sand is used in barrel cores, they become brittle and scrap loss in handling is high. However, the difficulty possibly can be overcome by changing the core binder specification from that used in aluminum work, and this is what Packard technicians have been attempting with some degree of success. Various types of binders have been tried, and binder finally selected seems to work out fairly well on a mix of one-third bank sand, one-third sharp sand and one-third reclaim sand. The reclaimed sand is processed through the same equipment used pre-

(*Concluded on page* 134)

COLOSSAL!

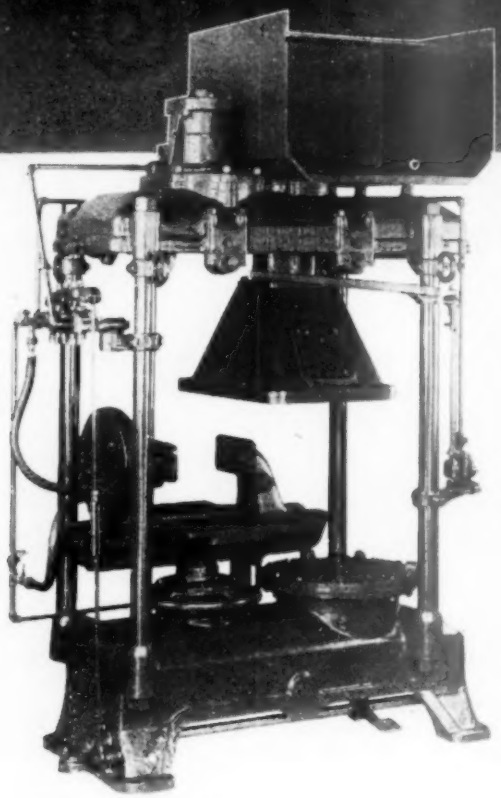
is the word for the Pacific War. It will call for huge amounts of supplies, most of which will require double and triple waterproof packaging to prevent ravages of mildew and dry rot. Every man out there needs 96 tons of supplies per year . . . which helps to explain why paper to pack and protect those supplies is a No. 1 war material shortage. That war paper doesn't come back . . . all the more reason why we at home should turn back for re-use every pound of paper we get.

Start right now . . . with this magazine! Share it with others who may not be able to get a copy . . . but be very sure that whoever is last in the line turns it in for salvage, unless it is to be preserved for reference. Then look around for bundles of old magazines in the attic, cellar or storeroom. Turn them in for the next collection.

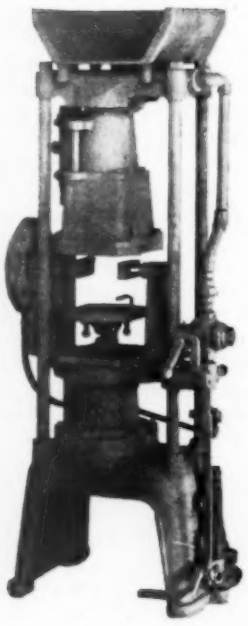
INTERNATIONAL *Sand Blowers*

are designed for Speed in Operation, Ease of Handling, and for the making of BETTER CORES.

There is an INTERNATIONAL Sand Blower to fit your every need. A call will bring an INTERNATIONAL Service Man with wide foundry experience to help you solve your core making problems.



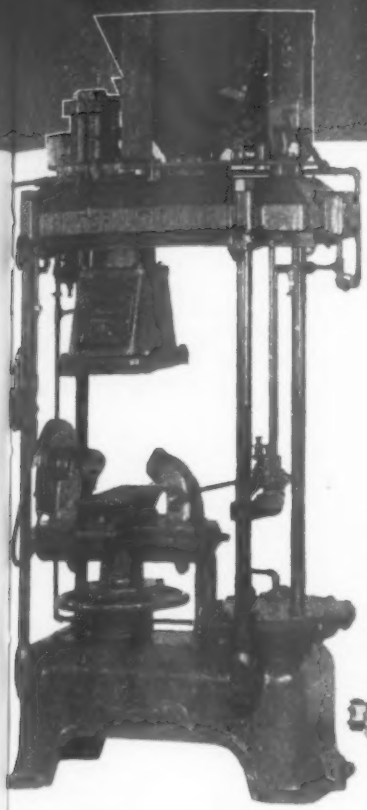
Type SB12—Adapted for large split boxes.



Type SB5 Sand Blower, adapted especially for small vertically split boxes.

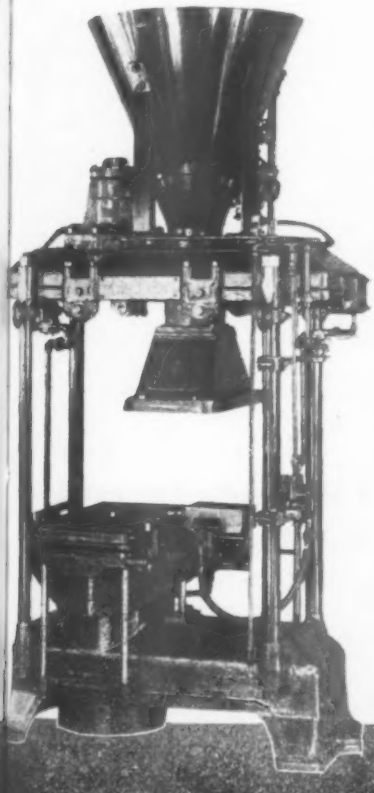
Type SB11—For medium sized cores with air clamp and draw feature.

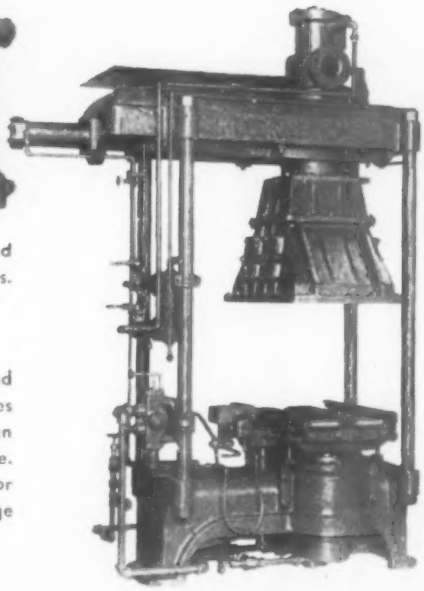
Type SB7 Sand Blower, adapted especially for small horizontally split boxes.



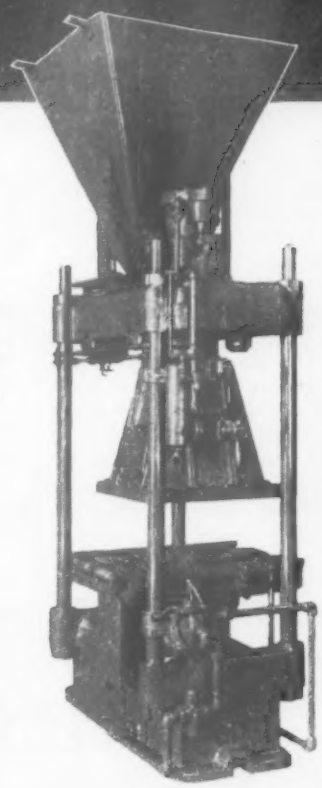
Type SB10—Sand Blower, adapted especially for medium size split boxes.

Type SB13—Sand Blower adapted especially for horizontally split boxes of medium size, but larger than can be handled by the **SB11** machine. May be had with the roll-out conveyor feature for ease in handling large core boxes.





Type SB15-H is adapted for the making of extra large Cores. Hydraulic clamp and draw feature.



Type SB17-H Sand Blower is the right machine for blowing those Super-Cores weighing up to 350 lbs.

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INTERNATIONAL MOLDING MACHINE COMPANY

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(*Concluded from page* 131)

viously in aluminum casting. Brittleness and scrap loss are not excessive. The aim now is toward a higher percentage of reclaimed sand, say 50 to 60 per cent, and its use for other types of cores as well.

Interesting method has been worked out for reclaiming Wood's metal at the Willow Run bomber plant, which incidentally will have completed its production history by July 1. Many of the 1800 odd aluminum tube sections used on the B-24 were bent, using Wood's metal filler. The alloy contains 50 per cent bismuth, 25 per cent lead, 12.5 per cent cadmium and 12.5 per cent tin; it melts at 150 degrees Fahr., and costs about 75 cents a pound. In similar industrial uses, it has been common practice to re-use the metal until it becomes so contaminated with oxides, slag and dirt as to require scrapping. By February, 1943, Willow Run had accumulated about 40,000 pounds of contaminated metal in its salvage department, and new supplies were being purchased at a rate of 5000 pounds per month.

A reclaiming process was developed which makes use of a three-tank refining system in which the first tank removes lighter oxides and slag by gravity. Metal from this tank pours into a second tank containing hydrochloric acid solution through which the metal passes in a thin stream down a series of inclined steps. Here the remaining oxides are removed by the acid. In the third tank traces of acid are neutralized and the purified metal then cast in pigs. One operator was able to reclaim 2000 pounds per day, and it was possible to discontinue purchase of new metal altogether, saving an estimated $200,000.

CASTING INSPECTION: *X-ray is employed extensively by Bendix Aviation Corp. in checking aluminum and magnesium castings produced for aircraft use*

Returns from Work With Chinese

Edwin K. Smith, who was sent to China by the U. S. Department of State, under the Cultural Co-operation Program, at the request of the National Resources Commission of the Chinese government, has returned. Mr. Smith spent eight months in metallurgical and foundry work in the Chinese iron and steel plants, particularly those of the Chinese National Resources Commission, and government arsenals, all of which plants co-operate closely in war production problems.

Due to the lack of raw materials and equipment Chinese foundries have been operating under great difficulties, and most of Mr. Smith's time was spent in helping to improve quality and increase production. He was particularly impressed by the splendid co-operation and courtesies shown by the managements, and the enthusiasm and hard work of the foundrymen.

Arrangements are being made by the Department of State to send much needed periodicals and technical books to Chinese plants to fill the need for up-to-date literature among foundrymen and metallurgists there, who are highly appreciative of any assistance and will make wide use of suggestions made to them and of literature as it is received. Mr. Smith described some of his experiences in an article which appeared in the May, 1945, issue of THE FOUNDRY.

National Instrument Society Formed

A new national society, to be known as the Instrument Society of America, was organized in Pittsburgh on April 28 at a conference attended by delegates from 15 measurement and control instrument societies that have been growing in different industrial centers throughout the country. The purpose of the society will be to advance the arts and sciences that are connected with the theory, design, manufacture and use of instruments. The society is non-professional, and offers membership to any person, firm or institution interested in the objectives of the society. The office of the secretary, Richard Rimbach, is the temporary office of the society and is located at 1117 Wolfendale street, Pittsburgh 12.

WPB Wage Incentive Guide Available

"A Handbook on Wage Incentive Plans" has been prepared by the War Production Board, outlining the development and operation of wage incentive plans and containing tables and charts on the relationship between wages, productivity and costs. It is available from the Superintendent of Documents, Washington, at 10 cents a copy.

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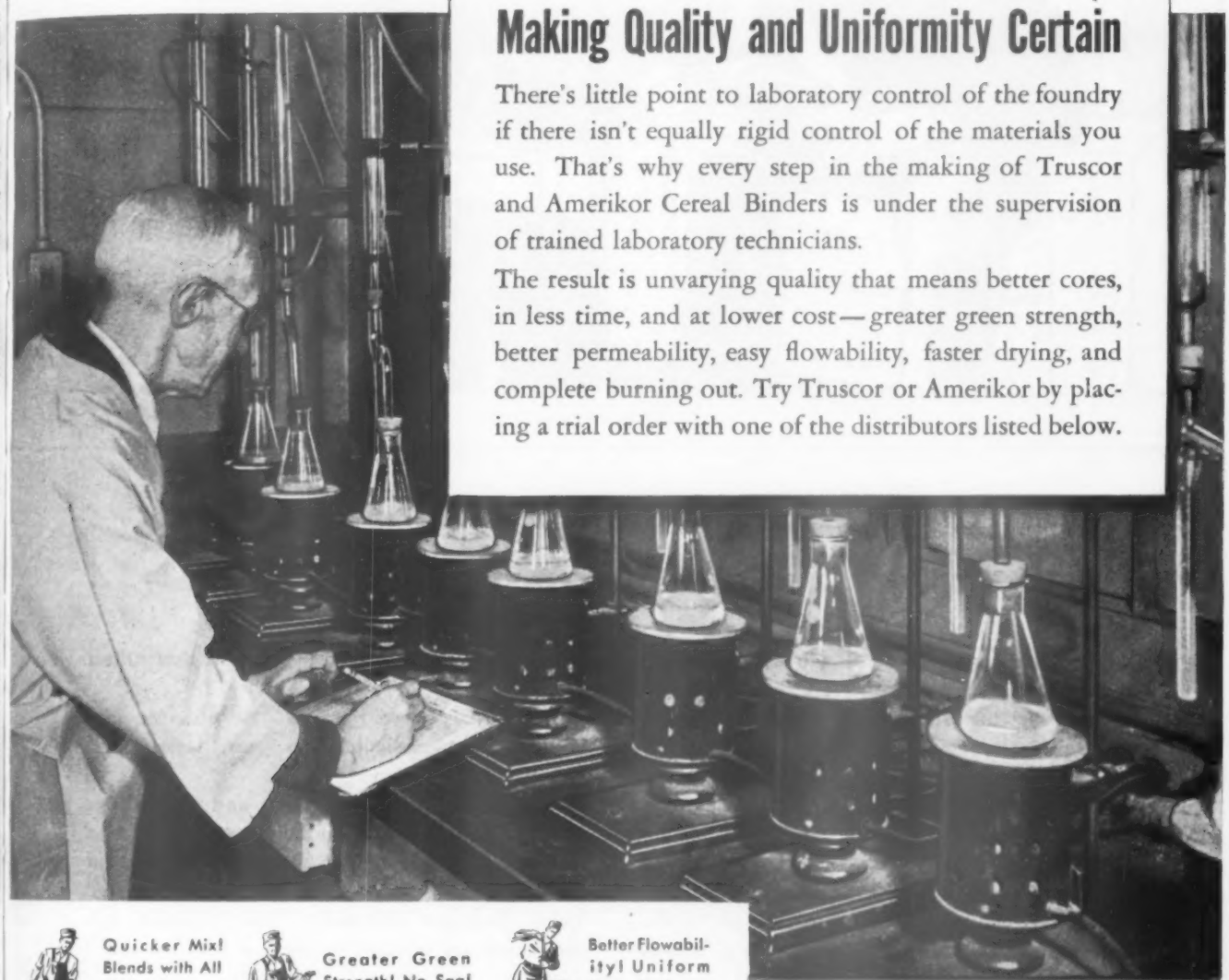
The result is unvarying quality that means better cores, in less time, and at lower cost—greater green strength, better permeability, easy flowability, faster drying, and complete burning out. Try Truscor or Amerikor by placing a trial order with one of the distributors listed below.



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No Sticking! Increased Production!

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Quicker Shake-Out Saves Time!

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"They really are 'Abrasive Headquarters'.

"And their engineering service saves us a lot of money! We call in a Great Lakes Engineer at regular intervals to check our blast cleaning operations.

"There is no charge for the service. And they are real specialists. They adjust the air to the correct pressure, the exhaust suction to eliminate excessive dust, and select the nozzle best suited for our work.

"Then they prescribe the *one* abrasive that will do that particular job best, fastest and cheapest.

"As a result we clean faster and all castings have a finer finish. Further, our power and abrasive costs have been reduced 25 per cent or more on the average. So calling in a Great Lakes Engineer on every blast cleaning job that comes up is naturally our standard practice!"

Make Great Lakes Engineering Service standard practice in your plant. Great Lakes has rendered this service for years. There is no charge! And whether you need blast sand, shot or grit—you will get the one abrasive that will do your job best at the least cost. Write or wire for this specialized service!

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FOUNDRY SANDS • SILICA SANDS
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RE-BONDING CLAYS

GRAY IRON CASTINGS FOR PRESSURE-CONTAINING PARTS FOR TEMPERATURES UP TO 650 FAHR.

(From American Society for Testing Materials Tentative Specification A 278-44T)

(Concluded from page 128, June issue)

INSPECTION

13. The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works that concern the manufacture of the material ordered. The manufacturer shall afford the inspector, without charge, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications. All tests and inspection shall be made at the place of manufacture prior to shipment, unless otherwise specified, and shall be so conducted as not to interfere unnecessarily with the operation of the works.

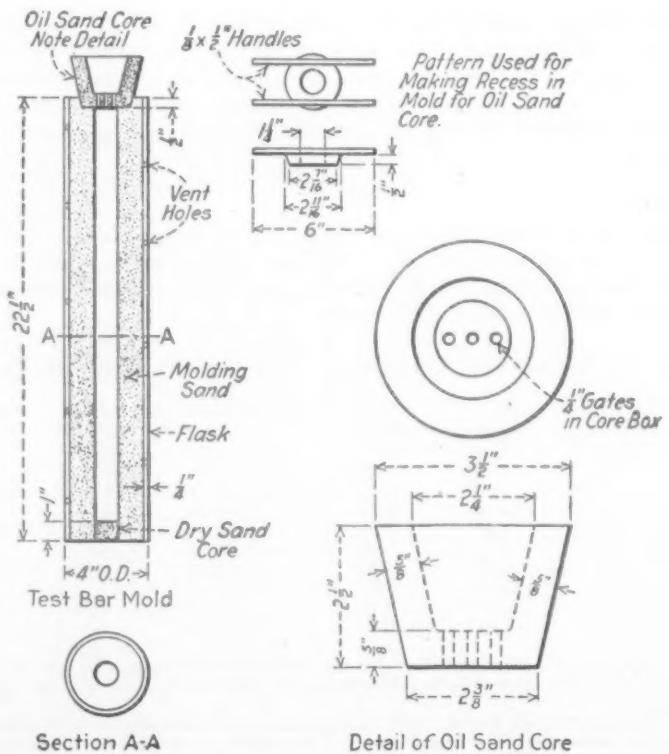


Fig. 5—Typical test bar cast vertically

EXPLANATORY NOTES

Note 1.—These classes of cast irons, Nos. 40, 50, and 60, would be considered high-strength irons, particularly in medium and heavy sections.

Note 2.—The higher-strength irons are usually more expensive to produce because of the following:

(a) Special melting methods,
(b) Possible use of expensive alloys,
(c) Changed practice in molding and pouring, and
(d) Improved technique and supervision.

Note 3.—In general, the higher-strength irons are more difficult to machine, also more difficult to produce in heavy sections. Consequently, specifying a stronger cast iron than is needed may result in unnecessarily increased costs in producing the casting and in machining.

Note 4.—Test bars shall be plain, cylindrical shapes as shown in Fig. 1. Where bars are cast on end, allowance for draft may be made. However, the diameter at the center of the length shall correspond to the nominal diameter, within the following permissible variations:

Test Bar	Permissible Variations, in.
A	±0.05
B	±0.10
C	±0.10

Tension test specimens "cast to size" are not recognized in these specifications.

Note 5.—A sound test bar is desired. Several methods of making test bars are shown in Figs. 3, 4, and 5. All of these methods of casting have been used and found to produce satisfactory results.

Note 6.—Test bars shall not be cleaned by tumbling unless the castings are so cleaned, or unless agreed upon by the manufacturer and the purchaser.

Note 7.—The use of ball and socket holders in the tensile strength test is recommended. Tests made under conditions where eccentric loadings may occur will give erroneous results.

Note 8.—The alloying elements commonly added to cast iron to improve its properties include chromium, copper, molybdenum, nickel and vanadium. Any combination of the above alloying elements which will assist in stabilizing the structure or retain strength at elevated temperatures may be used.

TENTATIVE SPECIFICATIONS FOR AUTOMOTIVE GRAY IRON CASTINGS

(From American Society for Testing Materials Tentative Specifications A 159-44T)

1. These specifications cover gray iron castings used in the automotive and allied industries.

HARDNESS

2. (a) Castings shall conform to the requirements as to hardness prescribed in Table I. By agreement between the manufacturer and the purchaser, hardness may be specified at definite locations on the castings.

(b) Hardness tests shall be made near the fracture on the broken halves of the test bars. Test bars shall receive the same thermal treatment as the castings.

TRANSVERSE STRENGTH

3. (a) The transverse test bar when placed horizontally upon supports and tested under a centrally applied load shall conform to the requirements prescribed in Table I. The values shown in Table I are for the 1.2-in. diameter bar tested on supports 18 in. apart.

(b) Transverse tests shall be made on test bars as described in the Standard Specifications for Gray Iron Castings (A.S.T.M. Designation: A 48). In case the size of the transverse test bar is not specified, the 1.2-in. diameter bar shall be used.

TENSILE STRENGTH

4. (a) Castings shall conform to the requirements as to tensile strength prescribed in Table I.

(b) Tension test specimens shall be machined from test bars and tested in accordance with the A.S.T.M. Specifications A 48. The tension test specimens shall be machined from the transverse test bars to the dimensions shown in A.S.T.M. Specifications A 48. By agreement between the manufacturer and the purchaser, tension test specimens may be taken from the casting at specified locations.

NOTE.—Tension tests made on specimens taken from castings may not agree with tests on specimens taken from test bars even though cooling rates are similar. Proximity to heavy or light sections may cause unsoundness.

TABLE I.—Physical Requirements of Automotive Gray Iron Castings.*

Alloy No.†	Brinell Hardness No.	Transverse Strength, min., lb.	Deflection min., in.	Tensile Strength, min., psi.
110	187 max.	1,800	0.15	20,000
111	170 to 223	2,200	0.20	30,000
120	187 to 241	2,400	0.24	35,000
121	202 to 255	2,600	0.27	40,000
122	217 to 269	2,800	0.30	45,000

* Properties determined on test bar 1.2-in. in diameter, broken on 18-in. supports.

† These numbers are identical with corresponding S.A.E. numbers in the Recommended Practice for Automotive Gray Iron Castings of the Society of Automotive Engineers. (1944 S.A.E. Handbook, p. 377).

WORKMANSHIP AND FINISH

5. Castings shall represent good foundry practice, shall be smooth and clean, and shall be free from injurious flaws and defects. In other respects the castings shall conform to special requirements agreed upon by the manufacturer and the purchaser.

MACHINABILITY

6. Castings shall machine satisfactorily.

INSPECTION

7. The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, without charge, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

REJECTION

8. All castings which fail to conform to any of the provisions of these specifications shall be subject to rejection. Castings which show injurious defects subsequent to their acceptance at the manufacturer's work will be rejected and the manufacturer shall be notified promptly.

TABLE II.—Typical Base Compositions of Automotive Gray Iron Castings.*

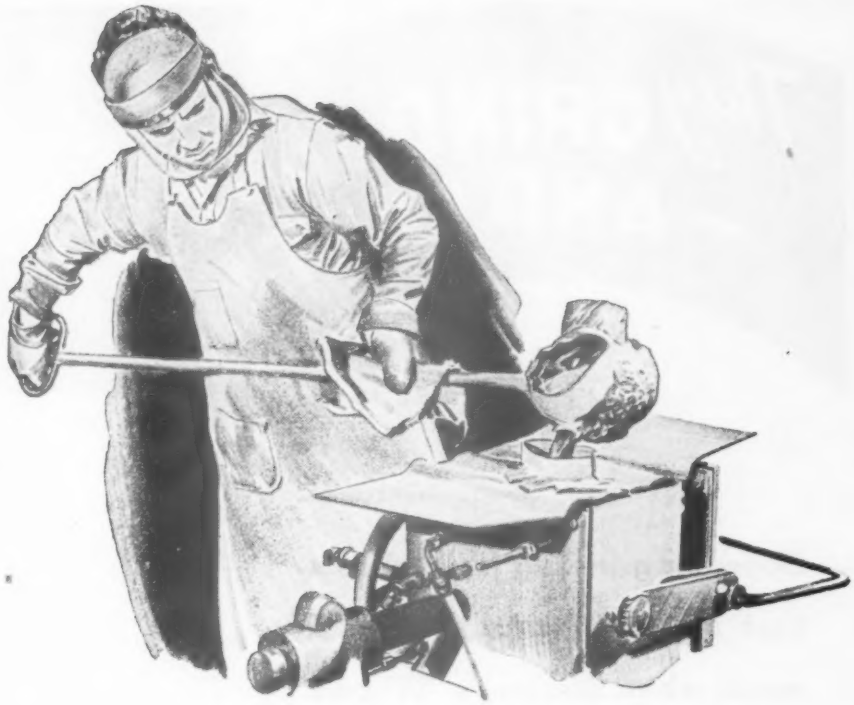
Alloy No.†	Total Carbon, per cent	Silicon, per cent	Manganese per cent	Sulphur, per cent	Phosphorus, per cent
110	3.40 to 3.70	2.80 to 2.30	0.50 to 0.80 0.50 to 0.80	0.12	0.25
111	3.25 to 3.50	2.30 to 2.00	0.60 to 0.90 0.60 to 0.90	0.12	0.20
120	3.20 to 3.40	2.20 to 1.90	0.60 to 0.90 0.60 to 0.90	0.12	0.15
121	3.10 to 3.30	2.10 to 1.80	0.60 to 0.90 0.60 to 0.90	0.12	0.12
122	3.00 to 3.20	2.10 to 1.80	0.70 to 1.00 0.70 to 1.00	0.10	0.10

* These suggestions are offered so that the manufacturer will guard against either a low value or a high value for both carbon and silicon. If either one is on the high side, the other should be low.

† These numbers are identical with corresponding S.A.E. numbers in the Recommended Practice for Automotive Gray Iron Castings of the Society of Automotive Engineers. (1944 S.A.E. Handbook, p. 377).

(To Be Concluded)

Just as magnesium casting alloys lighten products . . .



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CANADIAN FOUNDRYMEN

Meet in Montreal

By PAT DWYER

IN THE enthusiastic and freely expressed opinion of the large number of foundrymen fortunate enough to be in attendance, Chairman E. N. Delahunt and his hard working committee staged an outstanding success in the Regional Foundry Conference, May 17-18, in Montreal. This was the second event of this character under the auspices of the Eastern Canada and Newfoundland, Chapter of the A.F.A. The first was held in New Glasgow, Nova Scotia, at approximately the same time last year.

Attendance greatly in excess of expectation, 250 registrations, presumably half as many more part time and unregistered, and over 600 at the closing banquet in the Jacques Cartier room in the Mount Royal hotel, taxed the ingenuity and resourcefulness of the committee.

The program was arranged to give outside foundrymen ample time and opportunity to visit some of the outstanding ferrous and nonferrous foundries in Montreal. The committee provided transportation, and the plant managers co-operated cordially in throwing their plants open and providing guides for the various interested groups. The experience was impressive, enjoyable and educational.

Program for the first day included registration, plant visitation, informal luncheon, further plant visitation and a joint technical session in the evening. The program for the second day included further plant visitation, three simultaneous technical sessions in the afternoon, and a closing dinner with elaborate floor show at night for members and guests.

Reports of officers and committee chairmen were presented at the opening of the meeting Thursday night presided over by chapter chairman R. Bernard, La Cie J. A. Gosselin Ltee., Drummondville, P. Q. A report by Henri Louette on the season's activities of the educational committee featured four main subjects: Evening courses at Montreal technical schools; plant visitation for high school boys; educational lectures, a series of five consecutive lectures covering pattern and pattern design, foundry sands, foundry control, molding practice and foundry personnel relationship; and apprentice contest. The speaker stated that effort was made for future apprentice programs with the aid of the Provincial government and Rehabilitation Federal Act to sponsor a preliminary program of foundry apprenticeship along similar lines drawn up by the Builders Exchange.

P. E. Carrier, Joliette Steel Ltd., Joliette, P. Q., chairman of the membership committee, reported that the chapter now has 298 members, a highly gratifying showing for a chapter now only three years old. Supplementing this report secretary-treasurer Robert E. Cameron, Webster & Sons Ltd., Montreal, submitted a financial report which indicated that the chapter is in a sound and healthy condition. A. E. Cartwright, Robert Mitchell Co., Montreal, discussing the programs for the preceding years, regretted that up to the present means were not available for printing and distributing the papers, especially to the members prevented by time and distance from attending the meetings of the chapter. G. Ewing Tait, Dominion Engineering Works, Lachine, P. Q., reported on the work of the publicity committee and thanked those who assisted in the work. Chairman Bernard, first in English and then in French, felicitated the chapter, officers and committees on the highly complimentary record of the year's work.

Following a report of the nominating committee the following officers and directors were declared elected by unanimous vote: Chairman, G. Ewing Tait; vice chairman, Henri Louette, Warden King Ltd.; secretary-treasurer, Robert E. Cameron, Webster & Sons Ltd. Directors for three years: D. A. Allard, director school of aviation, Provincial Government; Ed. Laurendeau, Canadian Pattern & Woodworking Co.; James H. Newman, Chamberlain Engineering (Canada) Ltd.; O. H. Sevingy, Lynn MacLeod Metallurgy Ltd., Thetford Mines, P. Q. For two years: Romeo Leclaire, Dominion Engineering Works Ltd. Retiring directors include Paul Carrier, Joliette Steel Co.; P. A. Dauncy, Union Screen Plate of Canada Ltd.; L. Saindon, Quebec Brass & Iron Foundry Co. Ltd.; O. L. Voisard, Robert Mitchell Co. Ltd.

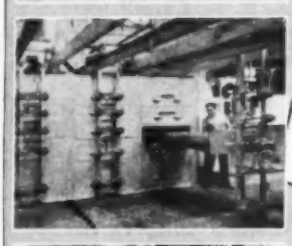
After the business meeting, Frederick G. Sefing, International Nickel Co., New York, was introduced by A. E. Cartwright and presented an illustrated lecture entitled "A Study of Molding Methods for Sound Castings," in which principal emphasis was placed on shrinkage, feeding and gas effects. He claimed that a thorough understanding and application of only a few principles are necessary to make sound castings in any type of metal. Gates should be designed to permit the metal to enter the mold quietly and rapidly. Rectangular cross sections generally are preferred over square or round gates. Controlled progressive solidification assists the freezing of the casting to begin at the coldest metal and/or the thinnest section, and to move progressively toward the hottest metal and/or the heaviest section.

Feeders should be designed and filled to assuredly feed castings by conforming to the principles of controlled progressive solidification. Plenty of pressure should be allowed to act on the molten metal in the feeder. Feeder capacity should be ample for the casting. Knockoff feeders are convenient to remove and they do feed adequately with soundness under the feeding head or riser. Chills or

(*Continued on page* 144)

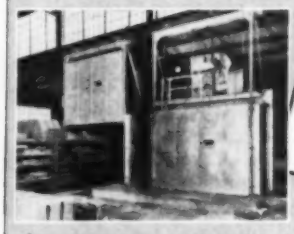
Reading left to right at speaker's table: A. E. Cartwright, director; Robert E. Cameron, secretary-treasurer; L. Saindon, director; G. D. Turnbull, director; Henri Louette, director; Robert E. Kennedy, secretary, A.F.A.; Robert Bernard, chapter chairman; G. Ewing Tait, chapter vice chairman; Alex Pirrie, director; William Baxter, director; E. N. Delahunt, retiring chairman

COLEMAN Portable Core Ovens

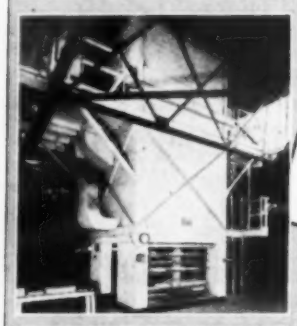


COLEMAN Rolling Drawer Ovens

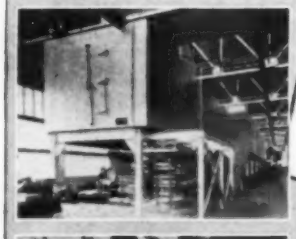
COLEMAN Transrack Ovens



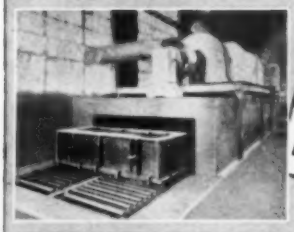
COLEMAN Car Type Ovens



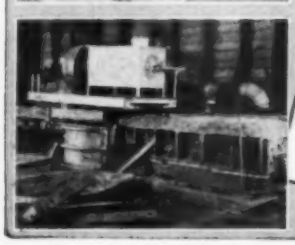
COLEMAN Tower Ovens



COLEMAN Horizontal Conveyor Ovens

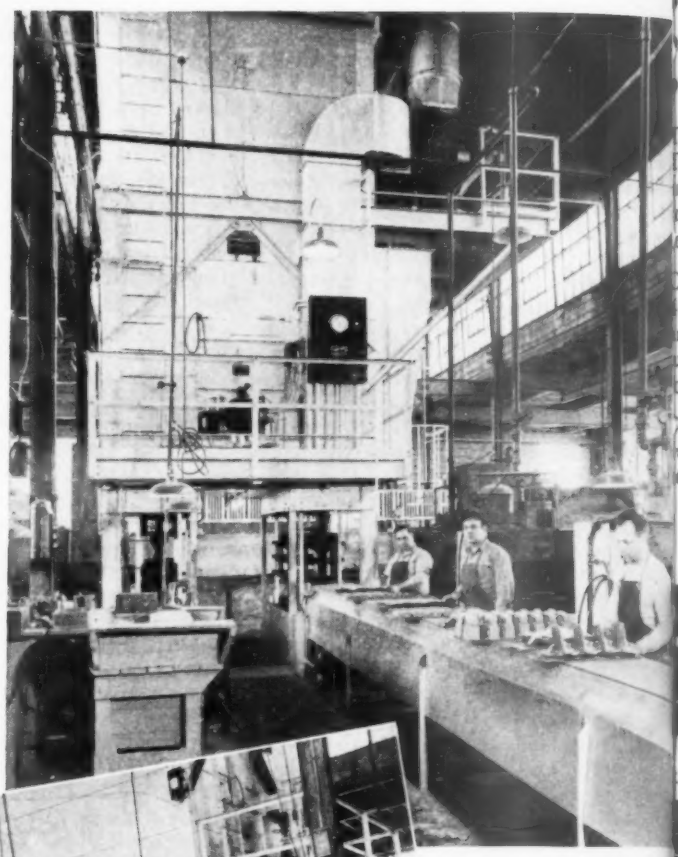


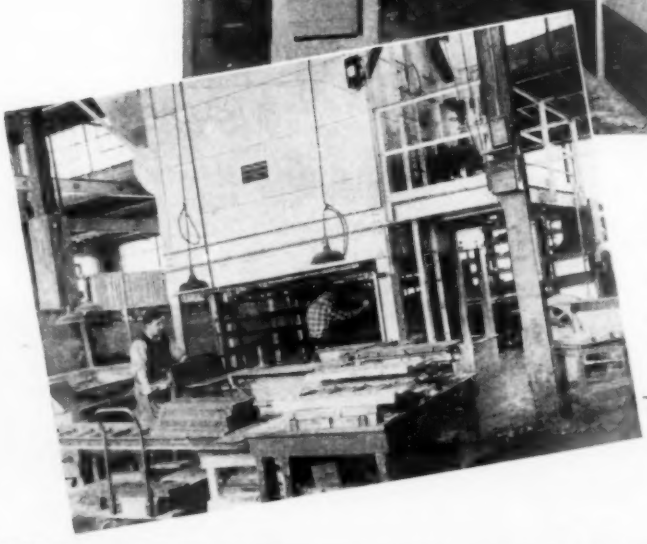
COLEMAN Conveyor Mold Ovens



COLEMAN Portable Mold Dryers

Another Endorsement of





Patented Center Passageway permits loading of Coleman Tower Ovens from both inside and outside the Tower, increasing loading accessibility as much as 300% compared with other vertical oven designs.

The FOUNDRY EQUIPMENT Co.

BUILDERS OF COLEMAN ANNAR

CLEVELAND 13HI

COLEMAN TOWER CORE OVENS

- DEPENDABLE PERFORMANCE
- IMPROVED WORKING CONDITIONS
- UNIFORM RESULTS
- REDUCED SPOILAGE
- GREATER ECONOMY

The same advantages reported by The New York Air Brake Company are also available to you through the installation of Coleman Core Ovens to suit your own production needs.

Coleman Ovens are backed by over 40 years of specialized experience and a record of thousands of successful installations in all classes of foundry work.

Coleman Core and Mold Ovens are built in all types and sizes to meet every operating requirement.

Write for Folio of Bulletins

ESTABLISHED 1890

THE NEW YORK AIR BRAKE COMPANY

WATERTOWN, NEW YORK

H. S. GULICK
ASST. TO THE FIRST VICE PRESIDENT

March 10, 1945

Mr. C. A. Barnett,
President & General Manager,
The Foundry Equipment Company,
Cleveland 13, Ohio

Dear Mr. Barnett:

In reply to your letter of March 5th we are glad to give you our general observations on the Coleman Tower Core Oven installed last year.

The Coleman Tower Oven has been in operation continuously twenty to twenty-four hours per day, seven days per week, for the past six months, which certainly proves its dependability under uninterrupted operation.

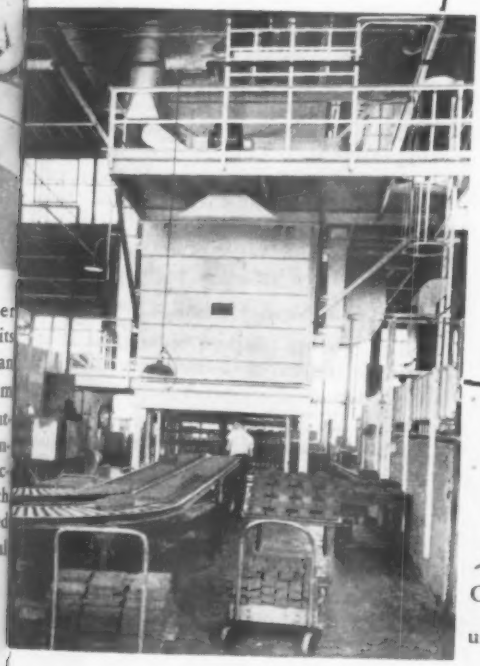
Coremakers and oven tenders prefer this equipment because of its lessened heat exposure and the fact that the cores come through the unloading position free from smoke and fumes.

We prefer the Tower oven because the resultant cores are more uniformly baked than with any other equipment we have ever used, and, hence, our spoilage is less and, our entire operation is more economical.

You may be sure we are pleased with this installation and are glad to highly recommend it.

Yours truly,

HSG/m



Coleman Tower Oven, unloading side.

COLEMAN CORE AND MOLD OVENS

...Company
...ANNARTWOUT OVENS
...13 OHIO, U. S. A.

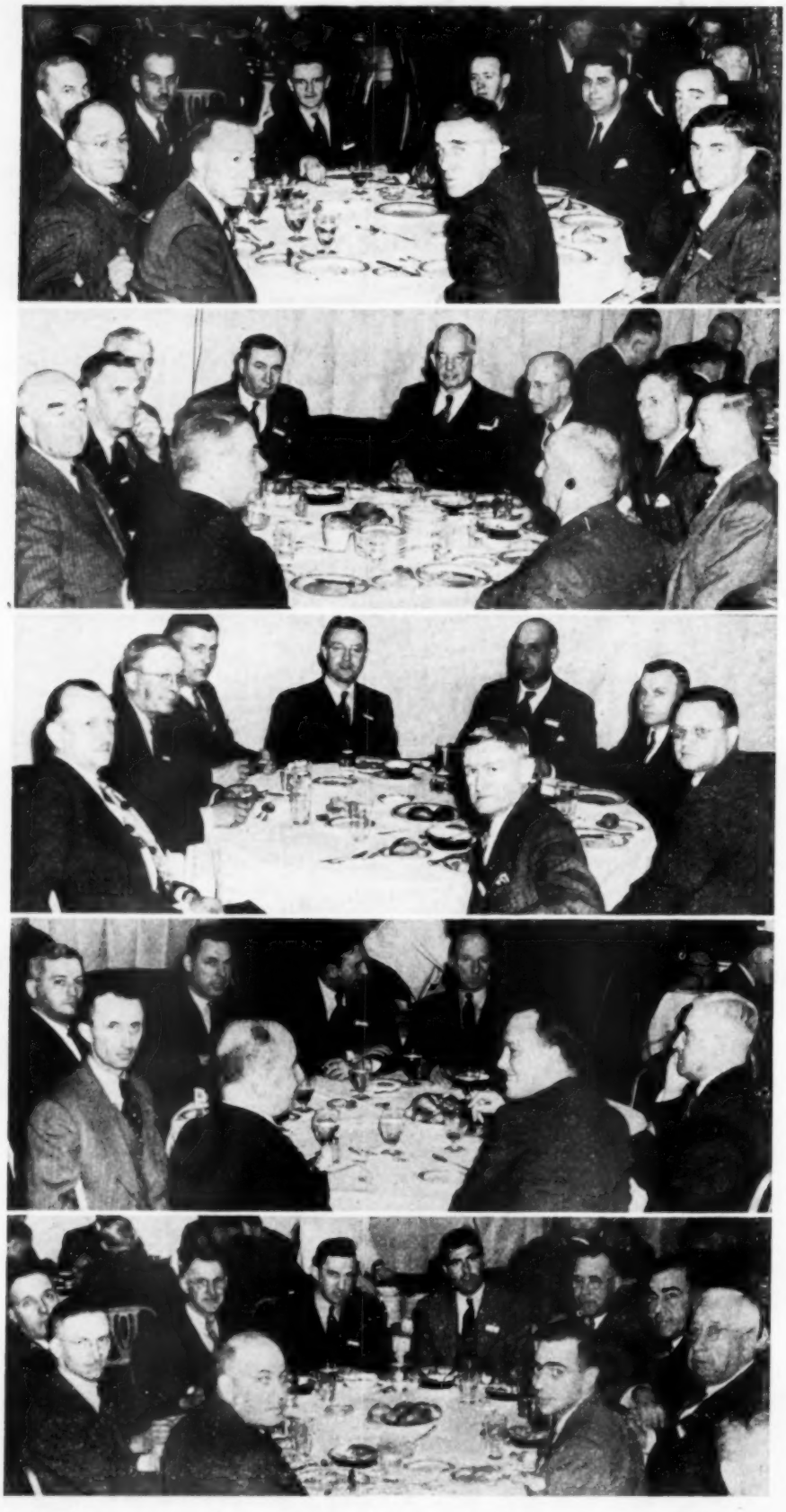
(*Continued from page* 141)

denseners are used where feeders are impracticable or where it is desirable to accelerate the freezing rate. Adequate venting prevents back pressure and permits filling the mold easily. Good venting also prevents gas absorption by metal in the mold. Additional vents or whistlers drain off cold metal, dirt, etc.

A porous defective area with a dull gray or black fracture indicates the presence of core or mold gas. This condition may be prevented by careful venting of cores and molds, avoidance of hot spots, and by using high liquid pressure. Where a wide variety of castings are made complete records of successful molding practice of each casting should be kept. The best record is a photograph of the casting as poured, indicating all gates, feeders and chills with all dimensions marked. By referring to the record at any future date the casting can be made without any trouble.

Three technical sessions were held simultaneously Friday afternoon. Under the chairmanship of Charles Brisbois, Frederick G. Sefing and W. L. Bond, Ottawa Car & Aircraft Ltd., Ottawa, discussed "Gates and Risers," with slides illustrating principles involved in typical cases.

At the sand handling and control session, presided over by A. E. Cartwright, a comprehensive discussion of many features was presented by H. J. Williams, New Jersey Silica Sand Co., Millville, N. J., and R. J. Maddison, Whitehead Bros. Co., New York. Mr. Cartwright contributed a paper on synthetic sands. On the subject of chills for nonferrous castings Mr. Williams claimed that brass chills are just as satisfactory as the usual iron chill. All chills should be kept clean and dry. Many materials are employed for coating the surface of the chills. Personally he preferred a mica wash. Replying to a question from the floor he said he had no experience with copper chills, but he thought with their high conductivity they should serve satisfactorily. Graphite chills have been used to a considerable extent on aluminum castings. With other speakers he agreed on the value of high heads.



Typical groups of members and guests at the noon luncheon which marked the opening of the second regional conference under the auspices of the Eastern Canada and Newfoundland chapter of the American Foundrymen's Association, Hotel Mount Royal, Montreal, May 17 and 18

One Sand For All Castings

The speaker touched upon some interesting features of foundry practice on naval repair ships where one grade of sand is used for castings in all metals and up to 5 tons in weight. The base sand is a washed silica sand, No. 70 grain fineness, moisture content 2.5 to 3.00 per cent, bonded with cereal binder 1.2 to 1.5 per cent, liquid binder 0.3 to 0.5 per cent. The sand is rammed hard for either green or dry sand molds and shows a permeability of 100 and a green compression strength of 5 pounds. Metal melted by the thermit process at a temperature of nearly 4000 degrees Fahr. is poured into the molds and the castings strip clean. The speaker also referred to gypsum riser casings that prevent piping, and to wire screens and other devices used on large risers with comparatively tiny connection with the casting.

E. C. Winsborough, Canadian Car & Foundry Co., presided over the third session devoted to a discussion of melt-

(*Concluded on page* 228)

Is Your Molding Sand Too Tough and Sticky?

¶ *Do you have difficulty ramming under flask bars?*

¶ *Are your castings rough because the sand will not ram to a hard smooth surface?*

¶ *Must you jolt an excessive number of times to get a hard mold?*

¶ *Do you get swells?*

¶ *Does your sand stick to patterns?*

DIXIE BOND
can cure your troubles!

¶ Dixie Bond makes a soft sand of high flowability—rams fast, increases production and gives a definitely better finish. Ask for our DIXIE BOND booklet!

Remember, please, that ECP service engineers have *five* different bonding clays and their many combinations from which to give you the one right recommendation and to assure you of receiving the *most bonding strength per dollar.*

EASTERN CLAY PRODUCTS, INC., EIFORT, OHIO

ECP

DIXIE BOND • BLACK HILLS BENTONITE • REVIVO BOND • REVIVO SUPER BOND • BALANCED REVIVO

All TYPES OF BONDING CLAYS

A Foundry Sand Service Based Upon Practical Research

foundry DEVELOPMENTS

THEORETICAL approach to account for varying structures in centrifugally cast aluminum alloys indicates that refinement of equi-axial grain-size is explained on the basis of solid nuclei formed throughout the liquid being centrifuged toward the outside and being packed together—thus interfering with one another's growth at an early stage. The residual liquid maintained free from independent nuclei subsequently solidifies from nuclei which formed on and adhered to the cold inner mold wall giving rise to columnar crystals. Columnar zone is higher in alloying element due to removal of purer solid of higher melting point from the inner zones of the casting. Centrifuging of first formed solid to outside promotes inward radial solidification even in absence of favorable temperature gradient, and remaining residual liquid of lower melting point is available to prolong feeding effect from inner zones. A greater potential soundness of centrifugal castings thus is to be expected. Reduction in casting temperature results in shorter columnar crystals by reducing time of solidification during which centrifuging action can occur.

° ° °

ONE OF the new developments in fire fighting to come of the war is the high-pressure fog method using a pump which develops 800 pounds per square inch pressure and delivers 60 gallons of water per minute through a spray nozzle. The water is broken down into countless minute droplets, and its surface is multiplied 10 to 35 times over water emitted in larger drops from a nozzle at ordinary pressure. Result is an instant cooling effect on the fire as the tiny droplets absorb heat while being turned into steam.

° ° °

ETHYL silicate in addition to its wide use as a bonding agent in investments for precision castings may be used to surface harden sand and graphite molds, and as an acid resistant binder for brick, mortar and other refractories. For use the ethyl silicate is mixed with water and denatured ethyl alcohol and allowed to stand for 12 hours. After that it may be mixed with powdered ceramics to form a slurry or diluted with alcohol and sprayed on the surface to be hardened. Following application the alcohol is set free by gradual evaporation at room temperature or may be baked out, leaving a form of sticky colloidal silica which dries to a hard, vitreous-like material. Porous sand molds coated with ethyl silicate solution are strengthened, hardened and stiffened by deposited silica. To obtain a smoother surface some filler may be incorporated in the solution. Ethyl silicate solution is used as a mold wash in production of some magnesium castings to eliminate sand inclusions. On graphite molds life may be increased. Ethyl silicate can be used to bond ferroalloys to the surfaces of sand molds in those cases where it is desired to obtain a casting with a skin or surface of one kind and interior of another—for example a chromium coating on a steel casting.

° ° °

RECENTLY a committee of the American Standards Association, New York, submitted for approval a newly drafted standard on a "Safety Color Code for Marking Physical Hazards." Briefly the standard is a codification of certain already widely recognized concepts regarding use of color for safety purposes. *Red* is indicated for the identification of fire protection and equipment apparatus; danger, and to indicate "Stop." *Yellow* is indicated for caution, and for marking physical hazards such as striking against, stumbling, falling, tripping, etc. *Green* is indicated for safety and location of first aid equipment. *White, black* or a combination of the two, for housekeeping and traffic markings. Much of the standard deals with suggested applications for these colors such as marking of safety cans, fire sirens, posts, hand rails, unguarded edges of platforms, location of gas masks, stretchers, etc.

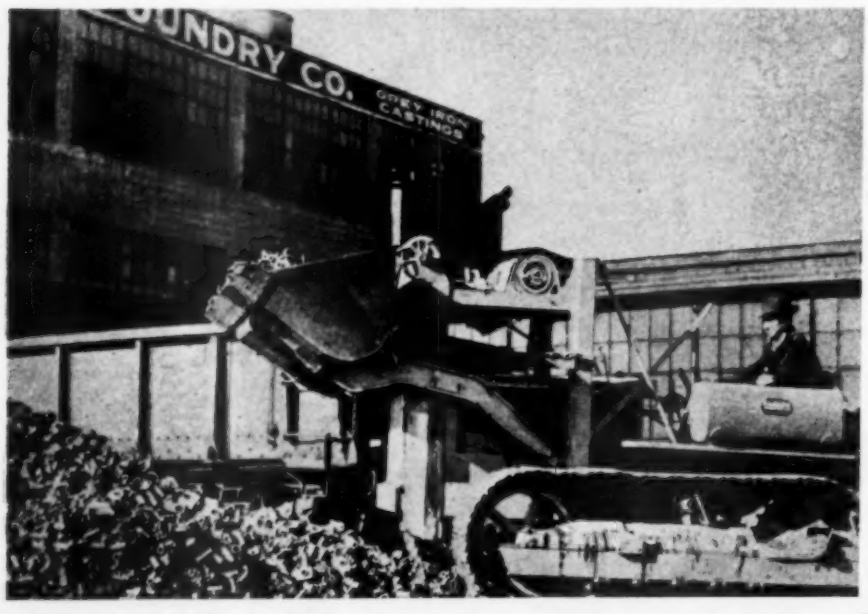
° ° °

ONE OF the postwar projects according to the DuPont company will be the color conditioning of industrial interiors to improve employe efficiency, health, comfort and morale. Described as the science of determining correct industrial environment for maximum vision, the system was developed by DuPont in co-operation with Faber Birren, a leading industrial color authority. The technique is designed to protect employes against eyestrain by reducing glare and eliminating extreme contrasts between light and dark. It recommends restraint in using color, especially distracting, over-stimulating hues as well as abolishing light-robbing dark areas. Research findings have determined correct colors for factory walls, machines and backgrounds within the field of vision. Only a few colors in combinations need be utilized, and new colors have been developed with hues subdued in tone, and unobtrusive and practical.

° ° °

STEEL, copper, brass, bronze, zinc, nickel, tin, gold, silver, aluminum, magnesium and other metals and alloys may be colored by simple processes of chemical immersion according to a recent announcement. It is claimed that a long range of colors is possible in iridescent and matte effects. Many of the coloring baths also increase the corrosion resistance of the metal being treated. Available as salts or solutions, the coloring media are supplied with instructions for use as well as those for preparation and cleaning of the metal or alloy.

E.B.



MATERIAL HANDLER: *Loading small castings at plant of Green Foundry Co., St. Louis. The machine consists of a Caterpillar diesel tractor equipped with handling device built by the Trackson Co., Milwaukee. It also is used to handle sand and slag and does clean-up work around the foundry*

YOU'LL PREFER THIS

Quality Seacoal

CROWN HILL

SEACOAL FACING

1. VENTS THE MOLD PERFECTLY

It's made from selected, high-volatile, quick-flash coal.

2. ELIMINATES HARD SPOTS IN CASTINGS..

Extremely low sulphur content.

3. CASTINGS PEEL EASILY...

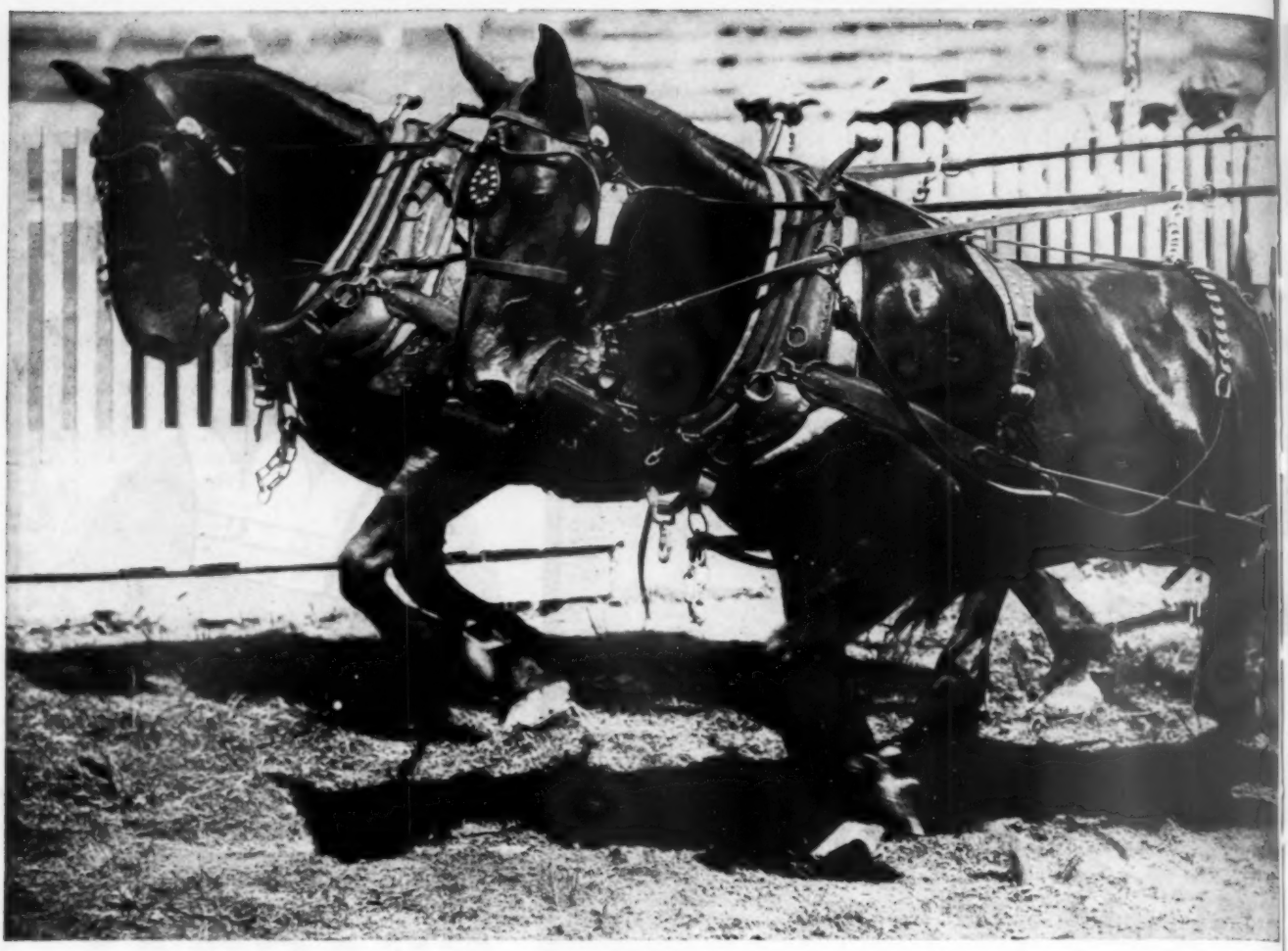
You'll save time and expense in the cleaning room.

THE FEDERAL FOUNDRY SUPPLY COMPANY

4600 East 71st Street • Cleveland 5, Ohio

Mines
...HILL, W. VA. • CHICAGO • CHATTANOOGA, TENN. • DETROIT • MILWAUKEE • NEW YORK • ST. LOUIS • RICHMOND, VA. • ...PTON, WYO.

IN TWIN CITIES: The Foundry Supply Co., Inc., 2295 University Ave., St. Paul 4, Minn.
IN SOUTHWEST: Beaumont Cement Sales Co., Houston & Beaumont, Texas, and Harvey, La.



A Great Pair

FOR THE HARD PULL

PROFITABLE casting production takes a lot of hard work. You can make the grade easier when you use MOGUL and KORDEK Binders to produce quality castings.

You can depend on them to save binder costs . . . reduce baking time and cleaning costs . . . increase oven capacity and core production.

MOGUL is a perfect Green Bond, which increases permeability in cores. Use MOGUL in cores for both green and dry strength.

MOGUL works with core oil; it decreases drying time and yields smooth cores. MOGUL works perfectly with pitch or resin, too, because cores can be handled while still warm. MOGUL is widely used with sharp sands.

TEAM UP WITH
MOGUL *and* KORDEK
You can depend on them

KORDEK

KORDEK is a perfect DRY BOND which can be used in smaller quantities than most dry binders. KORDEK produces better castings with fewer discards.

CORN PRODUCTS SALES CO. **17 BATTERY PLACE NEW YORK 4, N. Y.**

Activities of foundry GROUPS

Northwestern Pennsylvania

FOUNDRYMEN of northwestern Pennsylvania evidenced strong interest in the establishment of a new A.F.A. chapter in that area, when approximately 300 of them attended a meeting at the Moose Club, Erie, Pa., May 21, to take preliminary steps in the formation of a permanent organization. Nearly one-quarter of those present were from localities outside of Erie proper.

The committee in charge of arrangements for the highly successful meeting was headed by R. W. Griswold Jr., foundry superintendent, the Griswold Mfg. Co., as chairman, and included the following Erie men: Kenneth Guyer, foundry superintendent, Bucyrus-Erie Co; Earl M. Strick, finishing superintendent, Erie Malleable Iron Co.; William Miller, district sales manager, Frederic B. Stevens Inc., and Ralph T. Wedgewood, district sales manager, Pickands Mather & Co.

A capacity crowd attended the dinner preceding the business and technical meeting, which was held in the club's spacious assembly room with Mr. Griswold as chairman. As representative of A.F.A. headquarters, Robert E. Kennedy, national secretary, discussed the growth of the chapter movement in the association and the benefits to be derived from the co-operative activities the chapters provide. He also outlined the practical advantages of membership in the association. Petitions then were distributed for signing and forwarding to the A.F.A. board of directors seeking approval of the establishment of the new chapter.

Concluding portion of the meeting consisted of a technical session and had James H. Smith, general manager, Saginaw Malleable Iron Division, General Motors Corp., Saginaw, Mich., as its speaker. Mr. Smith, assisted by Stuart D. Martin, production manager of Saginaw Malleable, discussed and demonstrated how better methods and motion study can be applied to advantage in the foundry industry. By the actual making of simple cores Mr. Martin showed how production can be increased after motion time analysis has indicated where waste motion can be eliminated. These time savings in the various motions result largely from simple alterations in equipment and location of materials.

Following this demonstration, slides and a motion picture were shown to demonstrate numerous other instances in which relatively minor rearrangement of facilities at the speaker's plant have resulted in making the job easier for the worker and in raising production—changes which, in most cases, have been indicated as desirable through motion analysis.—*William G. Gude.*

Quad-City

THE May 21 meeting of the Quad-City Chapter of the A.F.A. was held at Hotel Fort Armstrong, Rock Island, Ill., with 116 members and guests in attendance. An interesting color film, "Big Game Hunting in Canada," was shown during the coffee period, following the dinner.

Ralph M. Monk, director of industrial relations, Caterpillar Tractor Co., Peoria, Ill., was speaker of the evening. His talk centered on the well known premise that employes can obtain higher wages only through increase in production or efficiency. Mr. Monk discussed management activities, discipline, production control and seniority problems. He concluded his talk by suggesting that employers develop broad educational programs on community levels.

New officers and directors were elected as follows: Chairman, C. E. Von Luhrte, Chicago Retort & Fire Brick Co., Davenport, Iowa; vice chairman, C. S. Humphrey, C. S. Humphrey Co., Moline, Ill., secretary-treasurer, W. H. Sundeen, Ordnance Steel Foundry Co., Bettendorf, Iowa. Directors for 3-year terms include: R. E. Wilke, Deere & Co., Moline, Ill.; H. L. Creps, Frank Foundries Corp., Moline; R. H. Swartz, Ordnance Steel Foundry Co., Bettendorf. Director for 1-year term, August Van Lantshoot, Iowa Malleable Iron Co., Fairfield, Iowa.—*H. L. Creps, secretary-treasurer.*

Southern California

TEST bar procedures and foundry sand analyses came in for exhaustive discussion at the regular meeting of the Southern California Chapter, A. F. A., held at the Clark Hotel, Los Angeles, on May 18.

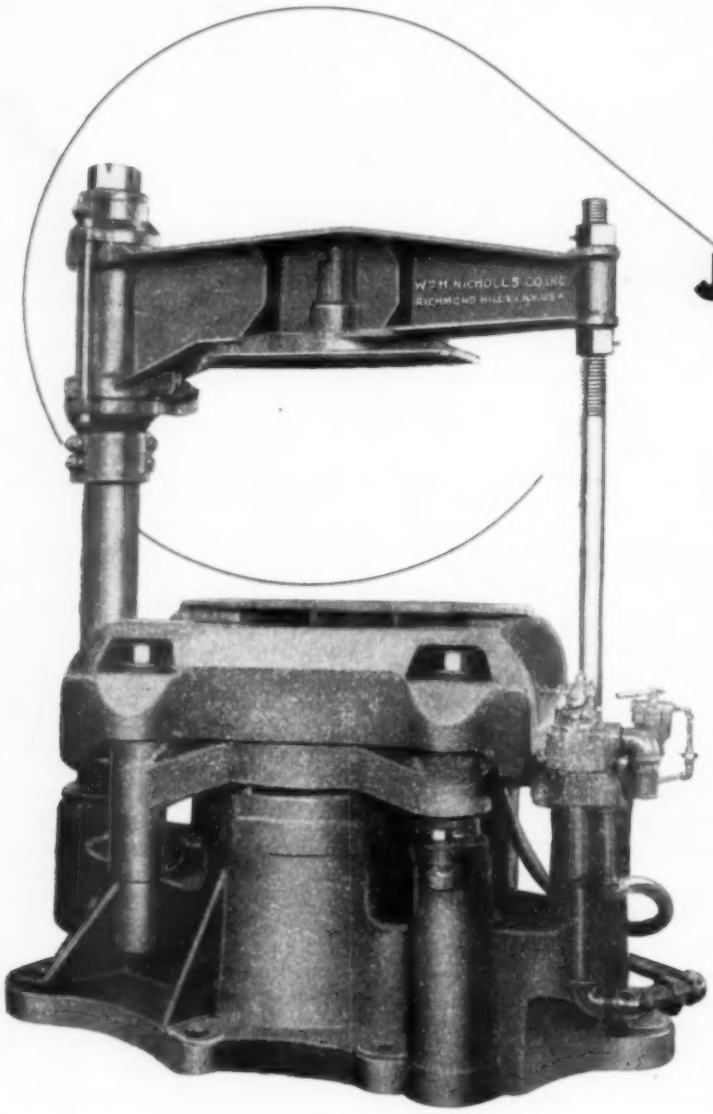
Principal speaker on the subject of test bars was Myron B. Niesley of the California Testing Laboratories. Adrian C. Den Breejen told what he knew about foundry sands and the problems of using them, which was plenty on both counts.

Mr. Niesley pointed out that unless a goodly quantity of test borings is taken at intervals from the bar, chemical findings are apt to vary because no mass of metal is ever homogeneous. He cautioned also against carelessness in cleaning of drills or other tools used to take samples, declaring that the presence of even a minute quantity of extraneous matter on a tool could change the results of analysis so as to render it worthless.

(*Continued on page* 152)

ERIE COMMITTEEMEN: Shown here with R. E. Kennedy, national secretary, A.F.A., are members of the committee which organized the successful meeting of northwestern Pennsylvania foundrymen at Erie, Pa., May 21. The meeting was a preliminary step toward formation of an A.F.A. chapter in that area. Left to right are: R. E. Kennedy; William Miller, Frederic B. Stevens Inc.; Ralph T. Wedgewood, Pickands Mather & Co.; R. W. Griswold Jr., the Griswold Mfg. Co.; Kenneth Guyer, Bucyrus-Erie Co.; Earl M. Strick, Erie Malleable Iron Co.

NICHOLLS Heavy Duty



No. 18-44 Type "K" Heavy Duty Jolt and Power Squeezer with Pneumatic Pattern Draw and Open End Frame. Equipped with Parallel Squeeze Head.

35 Years of

JOLT, SQUEEZE
Operated by

NICHOLLS Molding Machines are the product of 35 Years of improvement, research and tests. They are machines that embody all the highest requirements necessary in modern, high-speed foundry work and have proven their ability to "take it" day in and day out, regardless of production pressure.

BIG OUTPUT

Speed of operation for Type "K" Molding Machines is obtained by keeping the number of working parts and their controls down to a minimum. Consequently there is no lost motion and less confusion for a new workman. Another time saving feature is the parallel, self-positioning squeeze head.

PRECISION BUILT

NICHOLLS Molding Machines are completely built in our own modern machine shops, equipped with the proper machine

WM. H. NICHOLLS

Foreign Manufacturers and Selling Agents for Continental Europe and Great Britain

MOLDING MACHINES

...of Precision Building

...AND PATTERN DRAW....
...by PNEUMATIC POWER

tools and accurate jigs and fixtures. While the specifications call for close tolerances, still the moving parts are smooth and sensitive in operation with the freedom needed in speeding production.

LOW UPKEEP

To assure satisfactory performance over extended periods, dirt-proof housings and forced lubrication have been provided for all parts that might otherwise wear quickly. Large numbers of NICHOLLS Molding Machines have been delivered to foundries in the United States and other countries. Our service records indicate they are standing up with comparatively few requests for replacement parts.

CONTROLS

These machines can be equipped with Push-Button Control for all operations, including Jolt and Squeeze Timing.

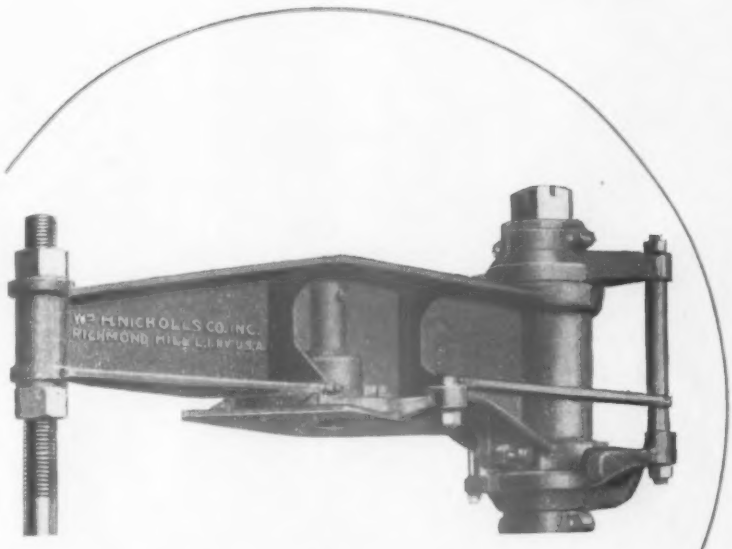


Illustration showing the rear view of the heavy cross-arm with outboard bearing and self-positioning parallel squeeze head

...LS CO., Inc. RICHMOND HILL (18), LONG ISLAND, N. Y.

...Great Britain—The George Fischer Steel and Iron Works, Schaffhausen, Switzerland

(*Continued from page* 149)

Mr. Den Breejen urged close examination of sands, preferably microscopic scanning of separate grains. This method, he said, will tell the foundryman a great deal about how the material should be handled and the work to which it is best adapted. Grains, for instance, showing fissures and cleavage planes under magnification of about 25 power are likely to disintegrate under heat and mechanical treatments necessarily given them.

He recommended as one simple test for limestone in sand believed to be mostly silica, the dropping of a few grains into hydrochloric acid; "boiling" would instantly show the presence of harmful amount of calcium chloride.

Both speakers defended western sands in general, making the point that locality alone is unimportant and that characteristics of different sands must be observed and analyzed in any event.

Secretary Henry E. Russill, Eld Metal Co., announced the election of new officers of the chapter as follows:

President, Robert R. Haley, Advance Aluminum & Brass Co., vice president, William D. Emmett, Los Angeles Steel Casting Co., treasurer, L. O. Hofstetter, Brumley-Donaldson Co.

Directors for two-year terms: Victor P. Barton, Triplett & Barton Inc.; Henry Howell, Howell Foundry; Charles R. Gregg, Reliance Regulator Co., and J. M. Crawford, Snyder Engineering Co.—*Maurice Beam.*

NORTHWESTERN PENNSYLVANIA: Some of the approximately 300 members of the foundry industry in the Erie, Pa., area who met in that city, May 21. Technical speaker was James H. Smith (top right), general manager, Saginaw Malleable Iron Division, General Motors Corp., Saginaw, Mich.

Northern California

NORTHERN California Chapter of the A.F.A. held its ninth meeting of the 1944-45 term May 11 at the Engineers' Club, San Francisco, with an audience of members and guests particularly attracted by the subject, "Design of Castings."

This program fulfilled an often expressed desire and was accomplished by appointing George McDonald of H. C. Macaulay Foundry Co., as special chairman. Mr. McDonald secured the co-operation of Charles Winslow, Winslow Engineering Co., Richard Vosbrink, Berkeley Pattern Works, Ray Wilson, Pacific Steel Casting Co., and Henry Hirvo of Enterprise Engine & Foundry Co., who devoted 20 minutes each to engineering, pattern-making, molding and machining of castings. The combined presentation was summarized by Chairman McDonald. The group was highly complimented for its efforts in producing what some said was one of the best programs the chapter has ever had, not only because home town boys furnished it, but because the group had given it a great deal of thought in 3 months of preparation. Parts had been rehearsed in committee meetings to allow for slams, and counter slams, much to the amusement of all, and particularly to members of the several craft representatives. Castings were exhibited to prove some of the points made.—*Richard Vosbrink, publicity chairman.*

New England

ON MAY 9 the regular monthly meeting of the New England Foundrymen's Association was held at the Engineers' Club, Boston, with 140 members and guests in attendance. Preceding the meeting a special session was held at the OPA clinic, between 3 and 5 p.m. at the OPA Regional Offices. At this clinic Weldon Welfling, chief, Castings Section, Iron and Steel Price Branch, OPA, Washington, spoke on, "Maximum Price Regulation No. 244," covering the sale and purchase of gray iron castings.

Washington representatives of OPA and of the Regional Office, Boston, were guests at the evening meeting and, follow-

(*Continued on page* 154)

Prompt Delivery of Certified Core Oil *Everywhere*–Stocked at Central Points...

The ever growing demand for Certified Core Oil has impelled the expansion of our distribution as well as our production facilities. Certified Core Oils are now warehoused at central points to insure prompt delivery to foundries everywhere.

Certified sales representatives likewise, efficiently serve the entire nation. It will be worth your while to know these Certified men; they can give you much practical assistance in obtaining better cores at lower cost.

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Houston 1, Texas

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Handlan Inc.
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Denver, Colo.

Industrial Supply Co.
1434 Howard St.
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LaGrand Industrial Supply Co.
2603 S.W. Front Ave.
Portland, Oregon

Mr. Tom Walls,
Sunbury, Ohio

F. F. Shortsleeve Co.
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Bloomfield, New Jersey

John B. Hayes
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CERTIFIED CORE OIL & MFG. CO.

"The House of Dependability"

3308-26 South Cicero Avenue, Cicero, Illinois

Stock and representatives: Buffalo, N. Y.; Elmira, N. Y.; Worcester, Mass.; Bloomfield, N. J.; Reading, Pa.; Sunbury, Ohio; St. Louis, Mo.; Milwaukee, Wisc.; Minneapolis, Minn.; Birmingham, Ala.; Houston, Tex.; Denver, Colo.; San Francisco, Calif.; Portland, Ore.

(*Continued from page* 152)

ing the dinner, Warren E. Huff, price executive of the Iron and Steel Branch, OPA, Washington, spoke briefly on "Problems Involved in the Sale and Purchase of Gray Iron Castings under Maximum Price Regulation 244 and the Success of Industrial Price Control as a Means of Preventing Inflation." Mr. Huff was introduced by A. B. Root, Hunt-Spiller Mfg. Corp. The OPA sessions proved to be most valuable and interesting and the association was indebted to Mr. Root for making the necessary arrangements to hold the clinic.

Chapter President Hosmer then introduced the guest speaker of the evening, Howard F. Taylor, Naval Research Laboratory, Anacostia Station, Washington. Mr. Taylor presented an outstanding address on "Gating and Risering of Ferrous and Nonferrous Metals." His extensive knowledge of the subject was evidenced by the attention he received throughout the talk. In commenting on the extreme care required to produce good castings, the speaker stated that in the majority of instances, in order to make a gray iron casting perfect, it is necessary to use a larger riser than were the same casting made of steel. All shrinkage can be overcome by risering and gating the casting properly. The value of the X-ray was mentioned and more extensive use of it in the iron and bronze field must be accepted. The quicker this valuable tool is adopted the sooner quality castings will be produced.

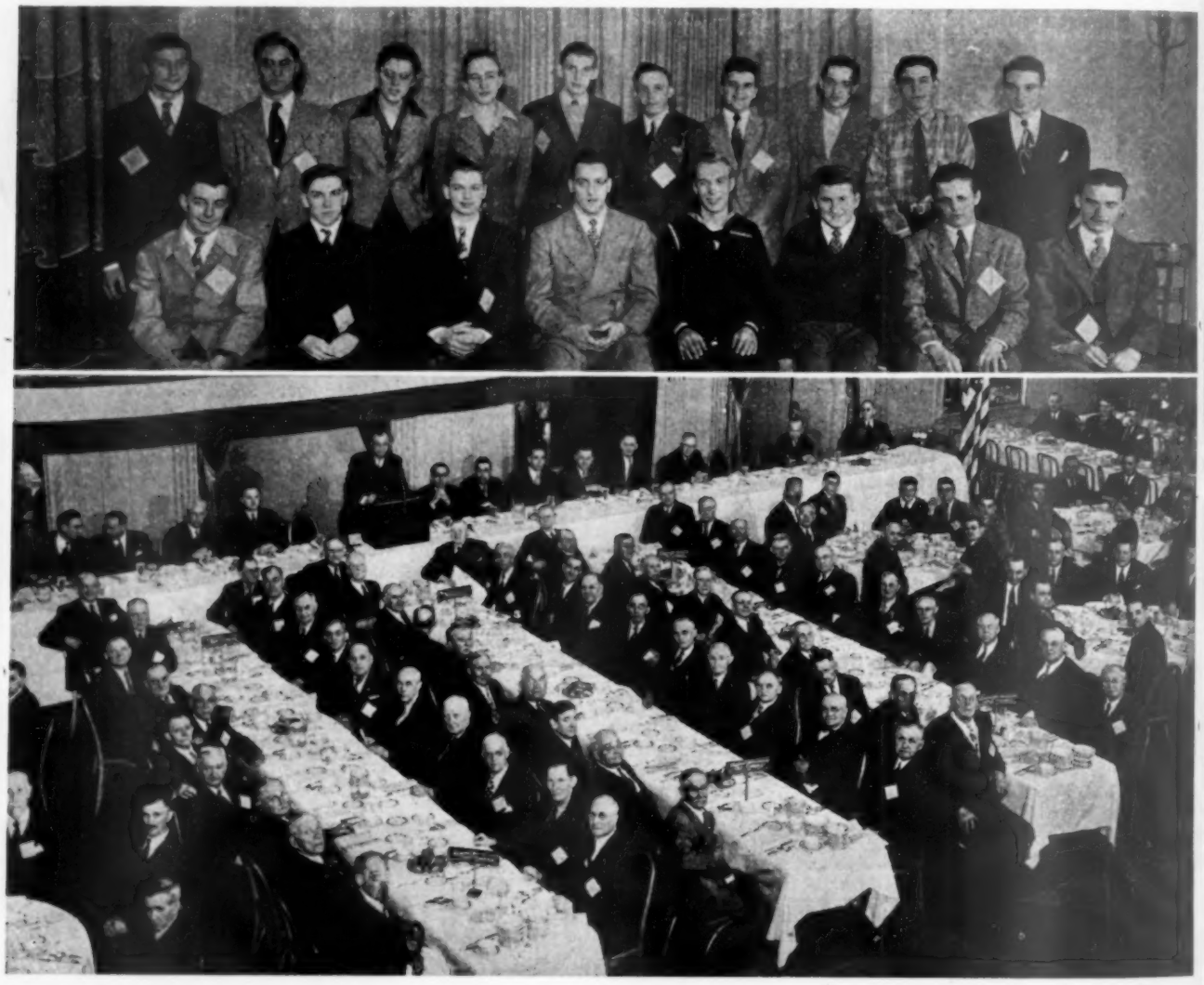
Test bars are a measure of the quality of the iron in the ladle only. Better test bars and more thought in drawing up specifications for test bars will be required of the foundry and engineer of the future. Patternmakers and foundrymen must get together even more closely in designing a pattern for a quality casting. Round risers are more effective than square or rectangular shaped ones. Rectangular vents, however, are often used satisfactorily. Considerable study and thought should be given to the advantage in the use of knock-off risers. The use of a liquidizer or insulator on risers is effective and many times necessary. As sand is an excellent conductor of heat, it is not recommended as a liquidizer. Mr. Taylor illustrated his points by a complete selection of lantern slides showing proper gates and risers, blind risers, etc.—*Merton A. Hosmer, president.*

Cincinnati

REGULAR monthly meeting of the Cincinnati Chapter of the A. F. A., held May 14 at the headquarters of the Engineering Society, Cincinnati, had an attendance of approximately 170 members and guests. William A. Rengering, chapter chairman, presided, and introduced representatives of the University of Cincinnati, who described plans of the university to incorporate a course on foundry practice in its curriculum.

E. H. Schleede, United States Gypsum Co., Chicago, in his talk on "Patterns of Gypsum Cement and Metal Casting in Plaster," which he supplemented with a sound slide picture, described in detail the applications of gypsum cement and the methods of making patterns from it. After the picture Mr. Schleede gave some

(*Continued on page* 156)

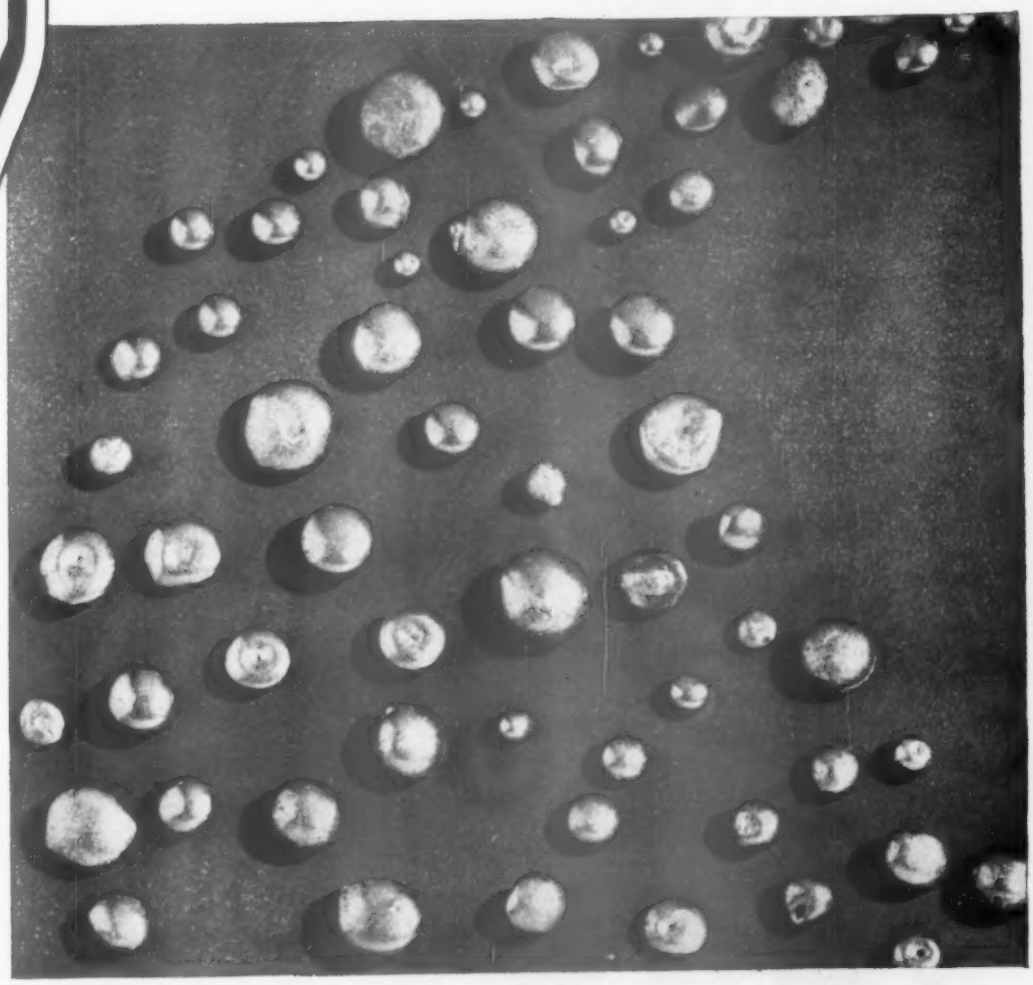


PAST AND PRESENT: *Men who entered the foundry industry 50 or more years ago and boys who now are serving apprenticeships were honored recently by the Wisconsin Chapter, A.F.A., when the group held its sixth annual Old Timers and Apprentices Night in Milwaukee. Chapter records list 110 men with a half century of service in industry, approximately 100 of whom still are on the job. (Photos courtesy John Bing, A. P. Green Fire Brick Co., Milwaukee)*

ALLOYS

SPI

NICKEL
COPPER
SHOT



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BIRMINGHAM OFFICERS: Newly-elected officers of the Birmingham District Chapter, A.F.A., for 1945-46 include, left to right: Vice chairman, T. H. Benners Jr., Woodward Iron Co.; chairman, J. Arthur Woody, American Cast Iron Pipe Co.; director, John F. Wakeland, McWane Cast Iron Pipe Co.; secretary-treasurer, Fred K. Brown, Adams, Rowe & Norman Inc.

(*Continued from page* 154)

interesting sidelights on the making of patterns from plaster, and told how to set up shop for their production. He pointed out that one of the principal troubles with the making of plaster patterns is that not enough care is given to the original mixing of the gypsum cement and water, also that very often the wrong types are chosen for the application. It was interesting to learn that gypsum cements can be produced which have compressive stresses of over 12,000 pounds per square inch, and that they are being used in many applications in the die and forming industries for the manufacture of models, patterns and molds.

The latter part of Mr. Schleede's talk was devoted to the making of metal castings in plaster, and he told of the many plants in which this process is now being used. There are three different patented processes for the making of castings in this manner, and these were described in detail. A question and answer period after the talk brought out that proper application of gypsum cement would save not only time, but also money, in the foundry industry.—*J Schumacher, secretary.*

Philadelphia

AT THE May 11 meeting of the Philadelphia Chapter of the A.F.A., 150 members and guests gathered at the Engineers' Club to hear C. K. Donoho, American Cast Iron Pipe Co., Birmingham, Ala., who spoke on "Centrifugal Castings." Dr. Arthur E. Schuh, director of research, U. S. Pipe & Foundry Co., Burlington, N. J., served as technical chairman.

Mr. Donoho's talk was supplemented by slides which were most interesting and instructive, in describing the centrifugal method of producing pipe and other types of castings. From the number and nature of questions asked from the floor it was evident that this was one of the most interesting meetings held this season.

The following officers and directors were elected to serve for the coming 1945-46 season: Chairman, John M. Robb Jr., Hickman Williams & Co.; vice chairman, B. A. Miller, Baldwin Locomotive Works; secretary-treasurer, W. B. Coleman, W. B. Coleman & Co. Directors newly elected include: Earl Eastburn, Phosphor Bronze Smelting Co.; H. E. Mandel, Pennsylvania Foundry, Supply & Sand Co.; J. W. March, Camden Foundry Co.; E. C. Troy, Dodge Steel Co.; C. L. Lane, Florence Pipe Foundry & Machine Co.; B. H. Bartells, University of Pennsylvania.

At the April meeting of the chapter, held at the Engineers' Club, 80 members and guests heard Walter S. Giele of Walter S. Giele Co., Lebanon, Pa., give an interesting discussion of foundry equipment, illustrated by the use of slides, which showed the various types of handling equipment in use in foundries. Harry Titgen, Quaker City Iron Works, was technical chairman for the evening. —*B. A. Miller.*

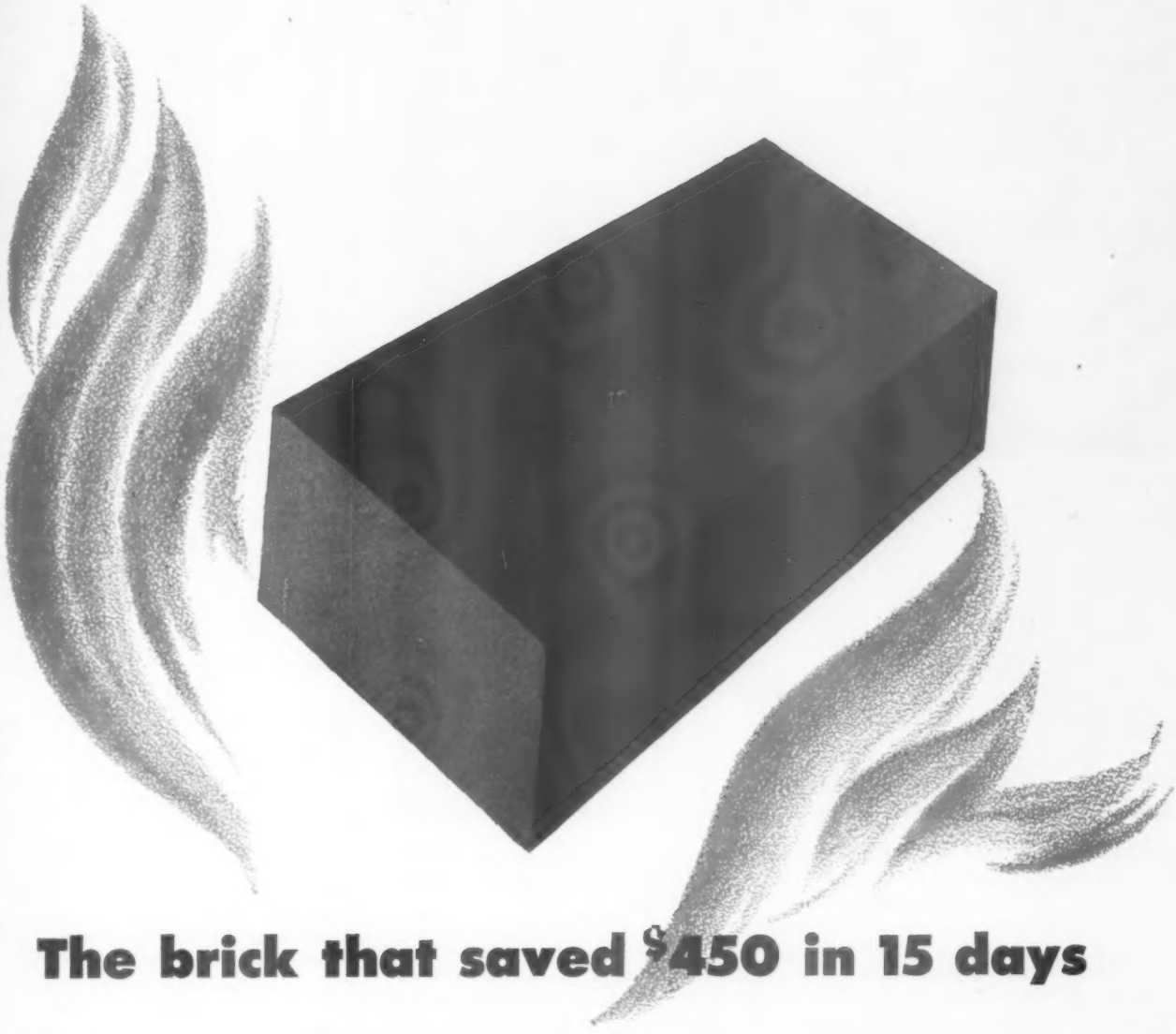
Birmingham

ON MAY 18, Birmingham District Chapter of the A.F.A., under the leadership of Joe T. Gilbert, chairman, completed one of the most successful years in its history. Jack Klement, chief metallurgist, Ampco Metal Inc., was the speaker, and used as his subject, "Melting Mediums for Bronze Alloys." Mr. Klement was born in Milwaukee, was graduated from Marquette University as a mechanical engineer, completed postgraduate work at the University of Wisconsin in metallurgy, and taught in the evening school of nonferrous metallurgy at the University of Wisconsin Extension. He has been associated with Ampco Metal Inc. since 1938.

Honors of the evening were especially directed to Dr. James T. MacKenzie, program chairman, and Abe Holberg, membership chairman. Dr. MacKenzie presented outstanding and most interesting speakers on vital subjects at each of the meetings, which resulted in greatly increased attendance and enthusiasm for the technical sessions. Mr. Holberg, with his committee which included George F.

(*Continued on page* 158)

WESTERN MICHIGAN: Showing a group of new members who attended the May 14 meeting of the Western Michigan Chapter, A.F.A. Under the leadership of C. J. Lonnee, chairman of the membership committee, the chapter has gained 65 new members the past 12 months



The brick that saved $450 in 15 days

Weighing less than 4 lbs. each, one Mexite Briquette, introduced into the cupola charge provides the same carbon content as 50 lbs. of pig iron.

Because of the present day spread between scrap and pig prices, Mexite Briquettes greatly reduce melting costs per ton. For example, one large foundry, by the use of Mexite Briquettes, cut their charge of pig by 50% and yet maintained a carbon analysis which varied less than 0.15% carbon during a fifteen day test period. As a result of the cheaper scrap charge, $450 was saved.

Mexite Briquettes not only cut costs by replacing pig, they also reduce the range of fluctuation of carbon content and give a steadier carbon analysis. This stabilizing factor is particularly vital when high percentages of steel are charged.

Mexite Briquettes give additional "life" and "freshness" to any heat, and often increase fluidity thus resulting in better castings and less scrap.

If you are interested in cutting costs, improving your iron and stabilizing carbon content, write today for complete facts.

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ALABAMA FOUNDRYMEN: Part of the audience at the season's closing meeting of the Birmingham District Chapter, A.F.A., which was addressed by John F. Klement, Ampco Metals Inc., Milwaukee

(*Continued from page* 156)

Vann, Frank Kopp, Dave Rooker, Paul Sullivan and Morris L. Hawkins, really sold the association to 59 new members. Abe is one of the charter members of the association and is one of its most loyal supporters. A member of the board of directors, he has secured more memberships for the chapter than any other man.

L. N. Shannon, a former national president of the A.F.A., served as chairman of the nominating committee which was composed of Lee Roueche Sr., E. A. Thomas, Alex Murdock and R. R. Deas Jr. The nominations submitted for election at the next meeting were as follows: Chairman, J. A. Woody, American Cast Iron Pipe Co.; vice chairman, T. H. Benners Jr.; secretary-treasurer, Fred K. Brown, Adams, Rowe & Norman, Inc. Directors nominated for the 3-year term include Joe T. Gilbert and C. P. Caldwell; for the 2-year term, J. T. MacKenzie and John F. Wakeland; and for the 1-year term, A. Leigh.

E. H. Schleede, development engineer on metal casting and pattern plaster for United States Gypsum Co., Chicago, discussed "Patterns of Gypsum and Metal Casting in Plaster," at the April meeting. During the afternoon, prior to the technical session, Mr. Schleede gave a demonstration of working plaster at the American Cast Iron Pipe Co., which was attended by 150 patternmakers from the district. The speaker used a most interesting sound slide film to illustrate the many different and difficult types of patterns that can be made from gypsum cements, which have been used for a long time but are new to the foundry industry. Possibilities for their use were greatly expanded during the need for increased war production, especially in airplane propeller production. Samples of precision castings from gypsum cement molds also were shown and their possibilities explained.—*J. P. McClendon, publicity director.*

Detroit

THE Detroit Chapter of the A.F.A. held its May 17 meeting at the Horace H. Rackham Educational Memorial with 140 members and guests in attendance.

Production roundtable conferences were held on brass, malleable iron and gray cast iron cupola operations. E. D. Mooney, Federated Metals Division, American Smelting & Refining Co., Whiting, Ind., discussed silicon bronzes before the brass group. Casting practice and its relationship to sand temperatures, cores and pouring were covered. J. P. Carrittee Jr., True Alloys Inc., acted as moderator, with about 37 in attendance.

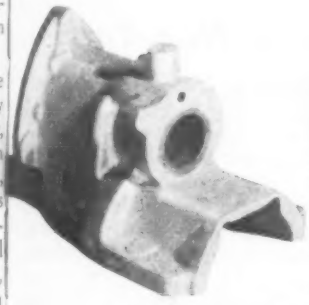
"Control Methods in Malleable Foundries," was presented by Charles Morrison,

(*Continued on page* 160)

SAGINAW VALLEY: Speaker's table at May 3 meeting of Saginaw Valley Chapter, A.F.A. A record-size group was present to hear and watch James H. Smith and Stuart Martin of Saginaw Malleable Iron Division discuss and demonstrate the benefits to be derived from application of better methods and motion study to foundry operations

Taming a rejection "nightmare"

How RADIOGRAPHY helped reduce machining rejections of a magneto housing from 33⅓% to less than 2% . . .



DESIGNED with features that simplified production—promised better service—this magneto housing was still no cinch to produce . . . was intricate . . . contained several inserts . . . required considerable machining . . .

Prints for the housing were released to the foundry . . . a casting technic was developed . . . castings delivered. Radiographic inspection—standard procedure with the customer—revealed irregularities in the flange. Rejections amounted to 33⅓%.

But the designer had faith in this housing—believed he was definitely "on target." Customer and foundryman stuck with the problem . . . knew co-operation would whip the bugs.

Rejected castings—and the radiographs—were sent back to the foundryman for his own analysis. Better casting technics developed, better castings were delivered. But radiographic inspection didn't stop there. Each day, rejects—and radiographs of them—were returned to the foundry. After 3 weeks this co-operation of foundry and customer resulted in a casting technic that "hit the nail on the head." *Rejections slid from 1/3 of production . . . to less than 2%!*

Repeatedly, such radiographic "case histories" show how x-ray is becoming a basic tool to industry. Going far beyond its original function as an inspection method, radiography helps streamline design, safely . . . develop sound processing and fabricating technics...reduce manufacturing costs.

Under pressure of rigid wartime standards of inspection, radiography has proved its ability to get out higher production . . . of higher quality. That ability will be doubly valuable in the scramble of postwar competition. *Now* is the time to investigate *full* use of industrial x-ray. See your local x-ray equipment dealer.

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The Pangborn Dust Control department is chiefly concerned with the task of correlating and evaluating the many facts about industrial Dust Control which it has gleaned from its many years of service to industry. These facts—results of actual operating experience in the field—have a great bearing on the design and construction of the equipment which is offered to industry to combat the great variety of problems.

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PANGBORN CORPORATION • HAGERSTOWN, MD.

(*Continued from page* 158)

Saginaw Malleable Iron, Division of General Motors Corp., Saginaw, Mich. Methods for control of melting, gating, heat treatment and inspection were covered thoroughly by the speaker. Discussion leader was George L. Galmish, Michigan Malleable Iron, Detroit, and this group was attended by 35 foundrymen.

Gordon Creusere, Semet Solvay Co., Detroit, acted as leader for discussion on "Cupola Operations," with H. S. Austin, Buick Motor Co., Flint, Mich., as speaker. Mr. Austin discussed bed preparation, lighting, charge makeup, melting rate, metal control and relining operations. All phases of operation were covered by active problems submitted from the floor by members and guests who numbered 110.

E. C. Hoenicke, Eaton Mfg. Co., has been elected chairman of the chapter for the 1945-46 season. A. H. Allen, Detroit editor, THE FOUNDRY, after serving 5 years as secretary, has been elected vice-chairman. H. H. Wilder, Vanadium Corp. of America, has been elected secretary, and W. W. Bowring, Frederic B. Stevens Inc., treasurer. New directors include: R. G. McElwee, Vanadium Corp. of America; G. Vennerholm, Ford Motor Co.; G. A. Fuller, Federal Foundry Supply Co.; J. P. Carritte Jr., True Alloys Inc.; G. L. Galmish, Michigan Malleable Iron Co.; and C. E. Silver, Michigan Steel Casting Co.—*H. H. Wilder, reporter*

Western New York

MAY 4 meeting of Western New York Chapter of the A. F. A. was held at Hotel Touraine, Buffalo, with 75 members and guests in attendance. Chairman Reinhold D. Loesch presided. Arthur H. Suckow, vice chairman of the chapter, and technical chairman for the evening, introduced the speaker, Fred Chambers, National Gypsum Co., Luckey, O., whose subject was "Gypsum Cement Pattern Making."

Mr. Chambers began with a description of the mining of gypsum rock and the subsequent process of calcining and grinding this rock to make gypsum plaster. The chemical change taking place when the rock is calcined, and when plaster is mixed with water, was discussed. The difference in physical characteristics between ordinary pattern plaster and Kalrok, a low consistency plaster, was outlined. Directions were given for proper mixing procedure for plaster for various kinds of work and the results of mixing plaster with too much or too little water as well as under-mixing and over-mixing, were given. The expansion characteristics of various kinds of plaster, and the use of accelerators and retarders was explained. A discussion of the methods of making and using cope and drag molds made from plaster for casting nonferrous metals followed. The methods of making aluminum match plates in plaster molds also were described.

Nominations for officers and directors for 1945-46, subject to election at the

(*Concluded on page* 162)

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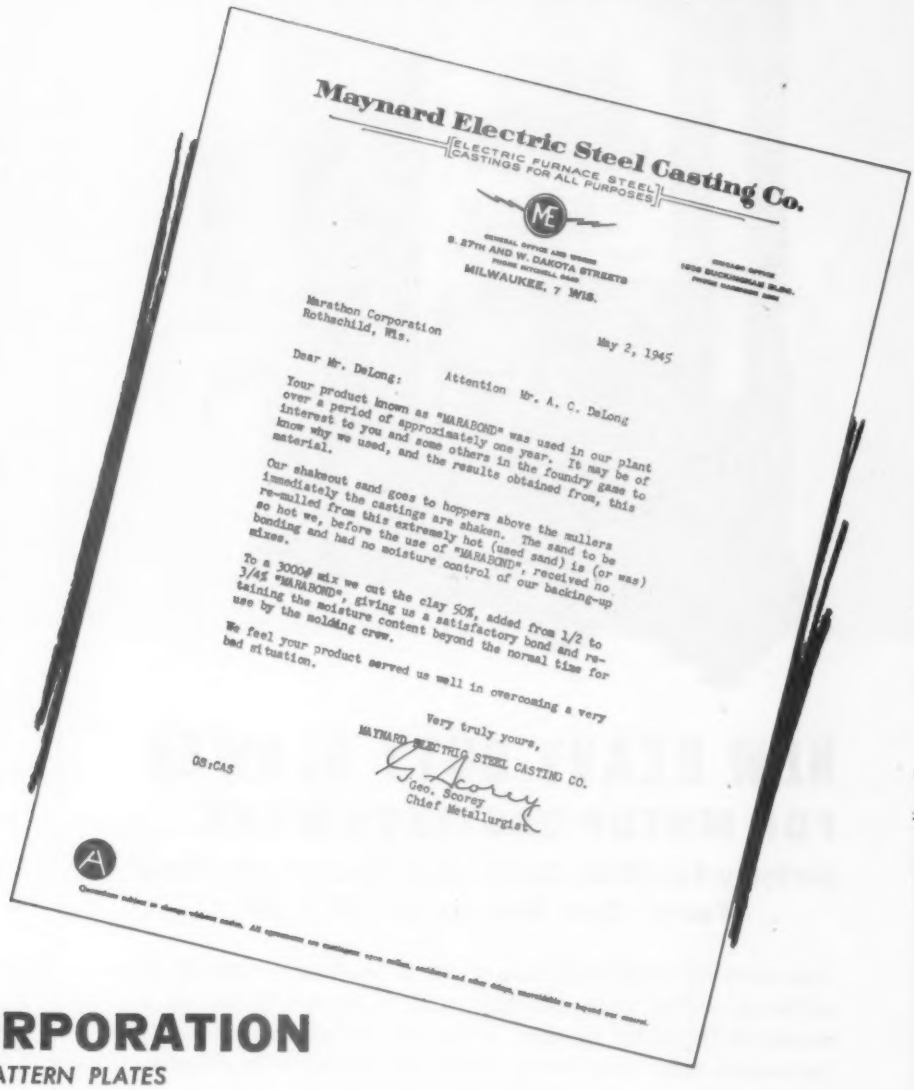
THE NEW TYPE ORGANIC BINDER PROVEN IN ACTUAL USE



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May 2, 1945

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Our shakeout sand goes to hoppers above the mullers immediately the castings are shaken. The sand to be re-mulled from this extremely hot (used sand) is (or was) so hot we, before the use of "MARABOND", received no bonding and had no moisture control of our backing-up mixes.

To a 3000# mix we cut the clay 50%, added from 1/2 to 3/4% "MARABOND", giving us a satisfactory bond and retaining the moisture content beyond the normal time for use by the molding crew.

We feel your product served us well in overcoming a very bad situation.

Very truly yours,
MAYNARD ELECTRIC STEEL CASTING CO.
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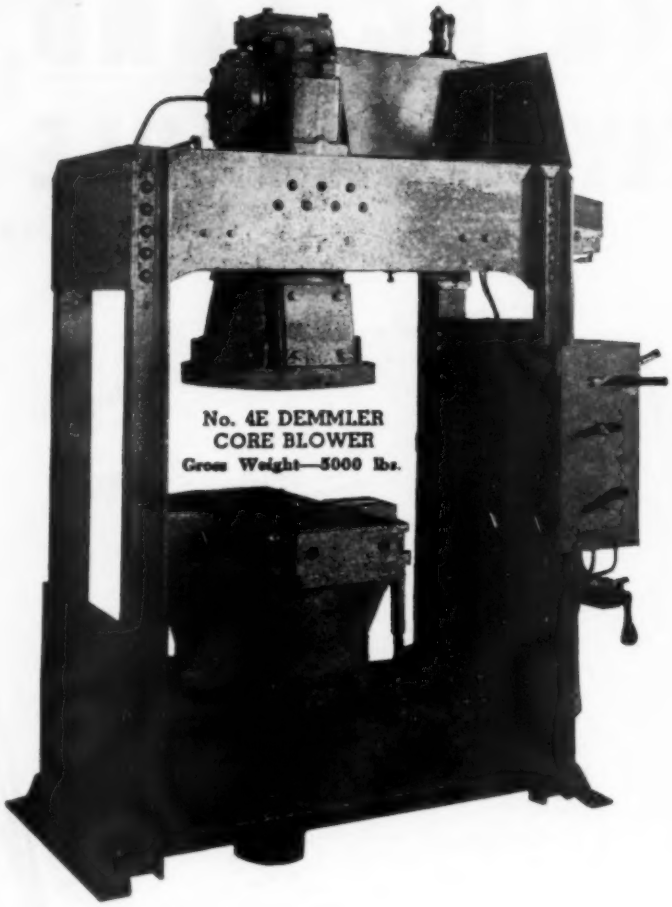

NEW HEAVY-DUTY BLOWER

FOR MOTOR CASTINGS WORK...

Strictly for BIG Cores and Fast Production
Takes Core Box up to 18" x 24"

Designed as a special blower for a leading producer of airplane motor castings, this unit is now offered as a standard Demmler blower. Features include an accurate hydraulic core box draw, table equipped with Timken rollers, 12" diameter throat opening, control mechanism totally enclosed. The height of the frame may be adapted to varying sizes of core boxes.

Reports on this new machine from users indicate that it has unusual possibilities in production of aircraft, tank and truck motor castings. At the present time we can make good deliveries, and invite your inquiries.

WM. DEMMLER & BROS. · KEWANEE, ILLINOIS

CORE BLOWERS *Exclusively*

(*Concluded from page* 160)

June meeting are as follows: Chairman, Arthur H. Suckow, Symington-Gould Corp., Depew; vice chairman, Henry C. Winte, Worthington Pump & Machinery Corp., Buffalo; secretary, Leo A. Merryman, Tonawanda Iron Corp., North Tonawanda; treasurer, Martin W. Pohlman, Pohlman Foundry Co. Inc., Buffalo; directors for 3 years: John C. Goetz, Acme Steel & Malleable Iron Works, Buffalo; Frank T. McQuillin, Standard Buffalo Foundry Inc., Buffalo, and Avitus J. Heysel, E. J. Woodison Co., Buffalo.

The spring dinner dance of the chapter was held May 12 at the Buffalo Trap and Field Club, Buffalo, and was attended by 200 guests. Many friendships were renewed during the evening, and the affair was voted a great success. Frank Bates, Worthington Pump & Machinery Corp., Buffalo, was chairman.

The chapter held a bowling party May 18 at Ideal Bowling Alleys which was attended by about 80 members. Refreshments were served later. Erwin W. Deutschlander, Worthington Pump & Machinery Corp., was chairman of this party.—*J. Ralph Turner, secretary.*

OBITUARY

FRED A. STEWART, 56, plant superintendent, National Malleable & Steel Castings Co., Cleveland, died June 4 in that city. Mr. Stewart entered the employ of the company in 1909, in the laboratory of the Sharon, Pa., plant. One of the country's first melters on electric furnaces, he introduced that system of melting steel at the company's Chicago and Cleveland plants. In 1918, after four years in the Chicago plant, Mr. Stewart was transferred to Cleveland as head of the melting department; in 1924 he was made foundry superintendent, and in September, 1944 was made plant superintendent. He was active in the work of the Northeastern Ohio Chapter of the A.F.A. and served at one time as a director of that organization.

° ° °

John Shaw, 81, prominent British foundryman, also well known in the United States which he visited on several occasions, died April 30. After completing his education at Widness Technical School and Liverpool university, Mr. Shaw served an apprenticeship with the Widness Foundry Co., where he was appointed assistant foreman at the age of 19. Four years later he was in full charge, and six years later he became foundry manager for Cochrane & Co., Dudley. During World War I he was director of the gray iron casting section of the British ministry of munitions. For several years before his retirement in 1927 he was manager of the Newhall works, Brightside Foundry & Engineering Co. Ltd., Sheffield. Mr. Shaw joined the Institute of British Foundrymen in 1906 and for three years was president of the Birmingham branch. In 1926-27 he was president of the Sheffield branch.

(*Concluded on page* 164)

No one at this moment can profess full acquaintance with all the uses of powdered metals. Production is being diversified too rapidly and knowledge of what can be done is being extended too fast, in too many directions, for that. But manufacturers who wish to inform themselves of such developments will find it of interest that the Molybdenum Corporation, being a supplier of high-purity metal powders and alloy powders of exactly specified content, is also a source of advice on many of the new possibilities in this field. Powders of molybdenum, tungsten, and boron, in different particle sizes and different degrees of purity, are made and recommended for different requirements. A descriptive catalog of M.C.A. products is issued and correspondence is invited.

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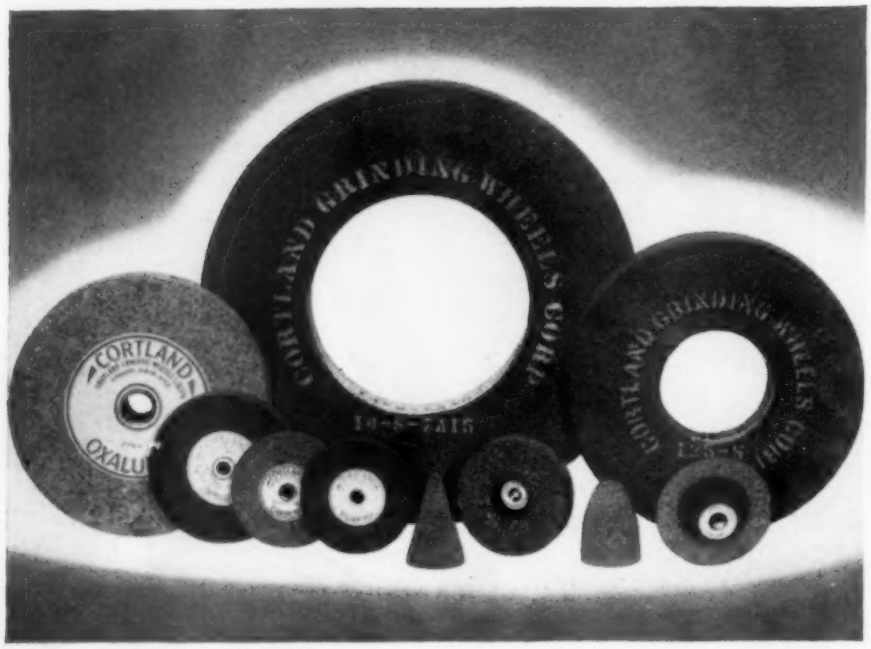

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It's a safe bet that Cortland has exactly the one you need, for the Cortland line includes Snagging Wheels in all sizes — all types. Mount them on floor stands or swing frames — or use them on portable grinders — you'll get rapid stock removal — longer wheel life — cooler grinding action on all types of castings, if you follow the recommendations of Cortland Engineers.

The Cortland policy is one of suiting the wheel to the job and its engineering and production facilities stand ready to work with you to that end.

Write freely about your problems to

CORTLAND GRINDING WHEELS CORP.
6 Cortland Street
Chester Mass.

For Better Snagging

CORTLAND

(*Concluded from page* 162)

As a fitting tribute to his services to the foundry industry he was awarded the Oliver Stubbs Gold Medal at the 1924 meeting of the Institute of British Foundrymen. At the 1926 Detroit International Foundry Congress, where he personally presented the British exchange paper, he was awarded the John A. Penton Gold Medal of the American Foundrymen's Association. At the 1928 convention of the A.F.A. in Philadelphia he presented a paper, "Theory or Practice in the Gray Iron Foundry."

° ° °

Joseph A. Balazs, 65, eastern sales manager of Hines Flask Co., Cleveland, died at his home in that city June 8. He was born in Cleveland, but at an early age moved to Pennsylvania where he learned his trade as a foundryman. He returned to Cleveland approximately 26 years ago and for varying periods held supervisory positions with the Forest City Foundries Co., and the Cleveland Co-operative Stove Co. About 7 years ago he joined the sales force of the Hines Flask Co.

° ° °

John Janitschek, 78, founder and part owner of the New Jersey Art Foundry, Jersey City, N. J., died at his home May 20. Born in Vienna, he received his early training at the Royal Art Foundry there. He had lived in this country since the early 90's, and was widely known as a producer of artistic castings.

° ° °

Walter S. McCann, 41, secretary of the Chain Institute Inc., Hand Chain Hoist Institute Inc., Electric Industrial Truck Association, and acting secretary of the recently organized Material Handling Institute, Chicago, died May 18 in Cleveland.

° ° °

C. Walter Spalding, manager, power transmission machinery, Link-Belt Co., Chicago, with headquarters at the company's Ewart plant in Indianapolis, died May 25 in Chicago. He began his association with the company in Indianapolis in 1910.

° ° °

Cary D. Terrell, who retired in 1938 as vice president in charge of the Chicago district, American Car & Foundry Co., Chicago, died June 2 in Shreveport, La.

° ° °

P. M. Kettenhofen, 72, for the past 39 years purchasing agent, Malleable Iron Range Co., Beaver Dam, Wis., died May 7 in that city.

° ° °

William T. Brassil, 65, vice president and general manager, Adams & Westlake Co., Elkhart, Ind., died June 3 in Chicago.

° ° °

Henry W. Wehr, 72, chairman of the board of the Wehr Steel Co., Milwaukee, died May 17 in Chicago.

HANNATEN IRON INGOT

10 POUNDS

for more efficient handling
for more uniform distribution
for more accurate control
for finer grain structure

THE BEST KNOWN NAME IN IRON

HANNA

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BRANDS:
SUSQUEHANNA • BUFFALO • DETROIT

The HannaTen ingot is the latest in a long series of Hanna developments to give you "better iron for better castings." Now available in all grades and brands of Hanna iron, this ten-pound ingot is easier to handle . . . assures more uniform distribution in the melt and more accurate control of the charge. A Hanna metallurgist will be glad to show you how HannaTen can meet your particular foundry needs. Just write, phone or wire the nearest Hanna office.

THE HANNA FURNACE CORPORATION

BUFFALO • DETROIT • NEW YORK • PHILADELPHIA • BOSTON • CHICAGO

MERCHANT PIG IRON DIVISION OF NATIONAL STEEL CORPORATION

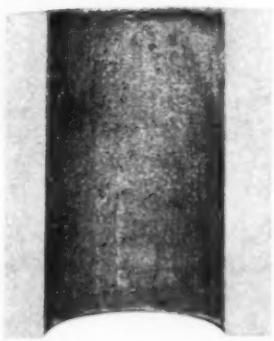
RIGHT COMBINATION

A strong smooth core does not guarantee a smooth casting.

CORE "A"

CORE "B"

CASTING MADE WITH CORE "A"



CASTING MADE WITH CORE "B"

Cores "A" and "B" are both strong smooth cores. In appearance and feel they are identical—but the castings are not identical.

The answer is in the combination of the ingredients in the core.

"A" is sharp sand and oil.
"B" is sand, oil and lion binder in the right combination.

Our specialists know the right combination—Let them work with you.

LION BINDER IS MANUFACTURED BY

J. S. McCORMICK CO.
PITTSBURGH, PA.

NAVAL RESEARCH LABORATORY

(*Continued from page 87*)

fired crucible furnaces. Rooms off the melting department accommodate motor-generator sets, equipment for measuring casting hardness, X-ray facilities and a dark-room for preparing radiographs. A 330 KVA motor generator set is now being installed which will power a ½-ton and a 1-ton induction furnace in tandem installation. A modern 1-ton arc furnace is expected to replace the present obsolete ½-ton unit.

The most unique melting unit in the foundry probably should not be called a furnace, since of itself it furnishes no heat, although it is used to bring a cold steel charge to pouring temperature in the remarkably short time of 45 seconds. The device consists merely of a refractory-lined, open-top steel container mounted on a stand which elevates the container bottom several feet from the floor. Explanation of the unit's source of heat is simple; the charge of as much as several hundred pounds consists of a special thermit mixture which, when ignited, becomes molten quickly and is tapped through the bottom of the container. This equipment and process were developed for use by Navy repair ships and advance bases in making emergency castings of Navy Class B, carbon-molybdenum and other grades of steel.

Five molders are employed in the foundry. The majority of castings made are those which can be accommodated in maximum flask size of 36 x 36 inches. Molding sand is received by the foundry in 100-pound bags and is prepared in either of two small mechanical mixers.

Use One Grade of Sand

Only one type of synthetic molding sand is used, regardless of the size of the casting to be made and of whether it is to be poured of iron, steel, aluminum or brass. This single all-purpose sand, developed after considerable experimenting, is used for facing and has a base of washed and graded silica sand of 80 to 100 A.F.A. fineness, to which is added 2 to 3 per cent bentonite, 0.5 per cent corn flour binder, 1.5 per cent dextrin and 3.5 per cent water. Further studies of all-purpose sands are being conducted.

Another outcome of the section's sand research work is development of a new technique for grading particulate materials which is proposed to replace generally-accepted standards set up by the A.F.A. The new practice, involving hydrometer analysis of finer clay and silt and sieve data for coarser sand grains, is said to be useful for specifying, controlling and understanding not only foundry sands, but also clays, ladle refractories, silica flour and precision casting investments.

A third important sand study concerns sand-metal interface reactions. This in-

(*Continued on page 171*)

Morton's SALT TABLETS

NOW AS FAMILIAR AND NECESSARY AS THE FIRST AID STATION

In the middle thirties salt tablets were a novel idea. Today practically all leading industrial plants wouldn't think of eliminating either salt tablets or first aid stations. Both are essential — the one to help prevent accidents, the other to repair them.

When workers sweat, their bodies lose essential salt. This loss causes Heat-Fag, inalertness, fatigue, heat prostrations. Accidents increase. Production goes down.

Morton's Salt Tablets at every drinking fountain provide an easy, simple, effective way to restore this vital salt lost through sweat. The cost is less than a cent a man per week.

In salt tablets, as with other grades and types of salt, Morton is the recognized leader. Order Morton's Salt Tablets and Dispensers from your distributor or directly from this advertisement. Write for free folder today . . . Morton Salt Company, 310 S. Michigan Ave., Chicago 4, Illinois.

MORTON'S DISPENSERS

They deliver salt tablets, one at a time, quickly, cleanly—no waste. Sanitary, easily filled, durable.

800 Tablet size - - $3.25

MORTON'S SALT TABLETS

Morton's Salt Tablets are available either plain or with dextrose.

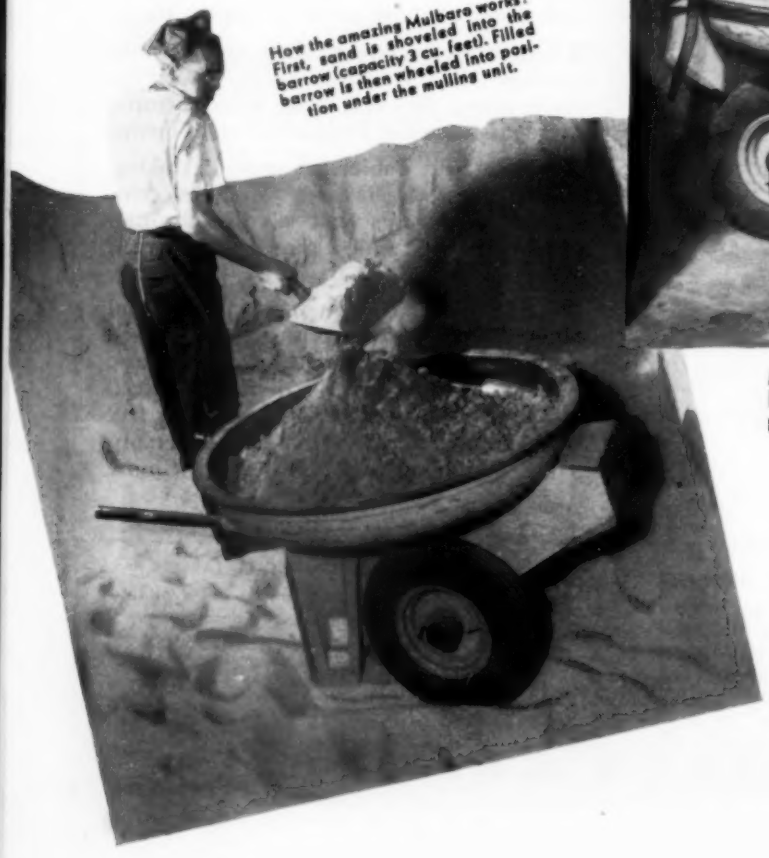
Case of 9,000, 10-grain salt tablets - - - - - - - $2.60

Salt Dextrose Tablets, case of 9,000 - - - - - - $3.15

MORTON'S SALT TABLETS

"WE CUT DOWN SAND PREPARATION TIME BY 50% WITH THE MULBARO!

Think of it . . . a *50% cut* in sand preparation time! This truly amazing part the Mulbaro is playing in sand preparation at Milwaukee Flush Valve Company is *all the more amazing* because the Mulbaro is doing just as important a job for dozens of other foundries, large and small, all over the country. Small foundries use the Mulbaro as a versatile, *all-purpose mullor* . . . medium and large foundries find it valuable as an auxiliary, *small batch mullor.* By using several extra Mulbaro barrows alternately, a large variety of sand can be mulled without contamination, thus eliminating a great deal of cleaning.



How the amazing Mulbaro works: First, sand is shoveled into the barrow (capacity 3 cu. feet). Filled barrow is then wheeled into position under the mulling unit.

Mulling unit is lowered onto barrow by means of a hoist. Required amount of oil is added to sand, starter button pressed and within a few minutes sand is completely mulled.

THE BEARDSLEY & PIPER COMPANY

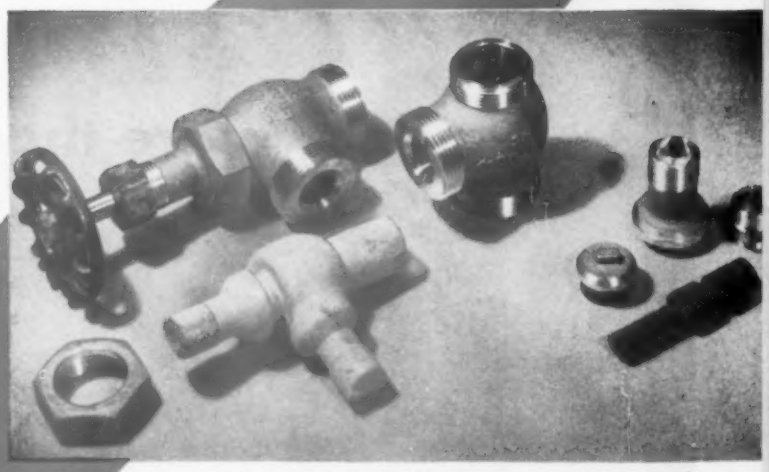
2540 N. Keeler Ave. Chicago 39, Illinois

● "A 50% cut in our core sand preparation time with the Mulbaro! That's a *real* saving!" say officials of the Milwaukee Flush Valve Company, Milwaukee, Wisconsin. "What's more the Mulbaro has paid for itself in oil savings alone in less than a year, due to more thorough, more uniform sand mulling which meets our exact molding requirements. With the Mulbaro, rejected cores are a thing of the past, and scrap has been reduced to less than 2% in our foundry."

Mulled sand is now moved away to molding machines, and another barrow of sand placed under mulling unit.

Handy, easily-moved barrow takes sand right to molding machines . . . a complete cycle of sand preparation within a few minutes.

● There's *nothing like the Mulbaro* in the foundry industry! It's a revolutionary, new, versatile, portable mullor that can do a thorough job of mixing all types of sand. It provides great flexibility with economy of operation . . . and at a very low initial cost! Mulbaro's motor is 2½ H. P. available in A. C. or D. C. and all voltages, cycles, and phases with the exception of 110 volt and single phase. Entire Mulbaro unit costs only $895.00 F.O.B. Chicago . . . additional barrows $95.00 each. Get complete engineering data and specifications on this amazing mullor. Write today.



Cores and finished product . . . a Navy valve, machined and assembled . . . ready to go. A better product because of cleaner, more uniform molds.

THE MULBARO ONLY $895*

*F.O.B. Chicago

THE BEARDSLEY & PIPER COMPANY ARE MANUFACTURERS OF SANDSLINGERS, SPEEDSLINGERS, SPEEDMULORS, SCREENARATORS, MULBAROS, SHAKE-OUTS, SAND CONDITIONING MACHINES, GYRATORY SCREENS

This Pair of AO Goggles

Paid for more than a Hundred Others

That's a conservative statement, for the average eye accident costs $343 for medical expenses and compensation, and safety goggles cost only about $1.50 per employee.
An AO Safety Representative will be glad to consult with your Safety Director and help work out a sound program for lower costs through safer methods.

American Optical
COMPANY
SOUTHBRIDGE, MASSACHUSETTS

(*Continued from page* 167)

vestigation of penetration defects and the influence of mold atmosphere makes use of a steel pin buried in the dilatometer sand specimen, a practice first devised by Howard F. Taylor at the Naval Research Laboratory.

Both static and centrifugal castings are made in the course of experimental and production work. Centrifugal casting equipment includes three machines, a horizontal unit with 12-inch inside diameter, a vertical machine accommodating flasks up to 25 inches in diameter and 24 inches deep, and a variable pitch machine.

Cores are baked in a batch type gas-fired oven, while principal equipment for heat treating castings is a car type furnace with a 5 x 6-foot opening and 8-foot depth. A quenching pit is located under the floor adjacent to the furnace.

Various types of equipment are available for snagging and cleaning castings. These include sprue saws; flame cutting, gouging and scarfing equipment used in connection with a radiagraph in removing gates and risers; pneumatic grinders; a sandblast cabinet and large belt sander.

Among other facilities in the foundry are gas and electric welding equipment, power saws, a large drill press, and a forging department. A feature of the forging machinery is the manner in which a 500-pound hammer is erected to prevent vibration from being transmitted throughout the foundry building. This is accomplished by setting the unit on a floating concrete block supported on three rails, ends of which rest on heavy coil springs. These springs, located below the floor level, are anchored to a concrete foundation.

Castings Moved by Monorail

Sand research is carried on in a laboratory on the ground floor where modern equipment of various types is provided, including a laboratory sand muller, ovens, dilatometer and a variety of other testing apparatus. Above this room is another laboratory where castings are examined and certain testing is conducted. Equipment here includes a 3000-ampere unit for magnetic powder testing and complete Zyglo facilities. A monorail near the ceiling of this laboratory extends out to the foundry proper and permits castings to be raised easily by a hoist and pulled into the room.

Special attention is given to the accuracy of metal temperatures in pouring castings, and a constant effort is made in the foundry to increase the accuracy of readings. One instrument developed to check molten metal temperatures in ladles or furnaces consists of a closed-end quartz sheath mounted at one end of a telescoping brass extension tube, with an optical pyrometer mounted at the other end. This device provides gas-free black body conditions for maximum accuracy and has been found satisfactory for use in molten brass and bronze as well as in iron and steel.

A separate department for making precision castings by the lost wax pro-

8 Screenarators

"DO WONDERFUL JOB"

FOR CHICAGO HARDWARE FOUNDRY CO.

● John H. Fienning, Superintendent of the Chicago Hardware Foundry Co., North Chicago, Ill. says: "Our eight Screenarators are doing a *wonderful job* in preparing our sands and are labor-saving at a very moderate up-keep."

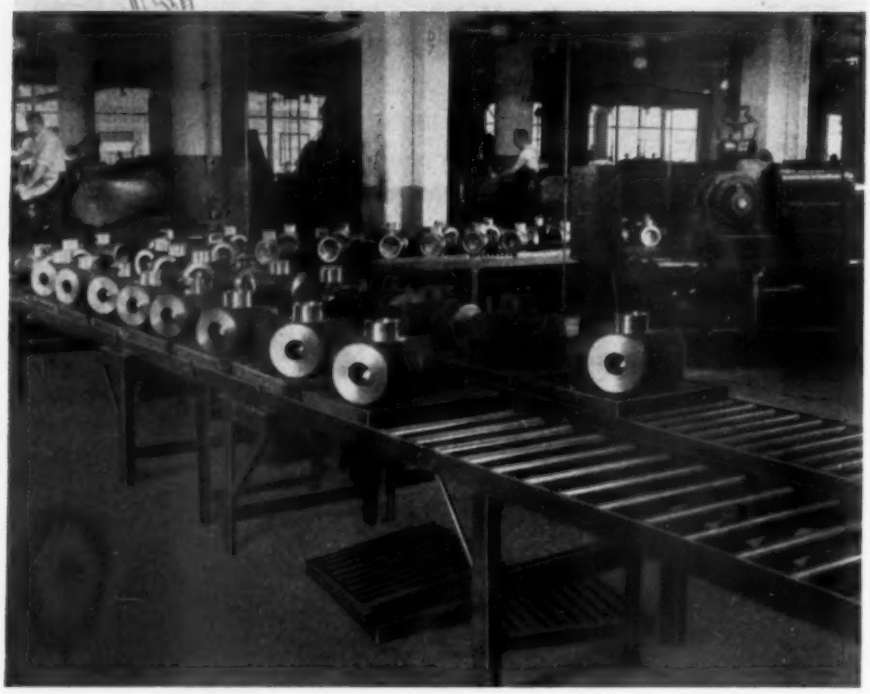
● Dozens of job shops and production foundries all over the country tell us the same story . . . how thoroughly the Screenarator cleans, cuts, screens, double-aerates and blends sand . . . how this versatile, low cost sand conditioner produces more flowable, more rammable sand that assures smoother finished castings . . . how it saves both time and labor. See for yourself how the Screenarator conditions sand the *way* you want it, *where* you want it! Write for complete information today.

THE BEARDSLEY & PIPER COMPANY

2541 North Keeler Avenue — Chicago 39, Illinois

Manufacturers of Speedslingers, Speedmullors, Sandslingers, Screenarators, Mulbaros, Shake-Outs, Sand Conditioning Machines

INDUSTRIAL "GOOD HOUSEKEEPING" *Pays Dividends!*



. . . A CONVEYOR-COORDINATED PLANT IS USUALLY A CLEAN, EFFICIENT PLANT

ORDER and cleanliness — freedom from congestion—smooth flowing channels for production — safety for workers — these are important additional advantages gained from conveyors — they contribute substantial added savings to time and handling-cost economies conveyors provide.

The steps you take now — the investment in conveyors that you make at this time to coordinate your production — eliminate disorder and confusion — cut your handling costs — will not only pay immediate dividends but yield an even greater return in the days of competitive production to come.

Knowing how to apply power and gravity conveyors to best advantage is equally as important as building them well. An experience record of more than 40 years, serving all classes of industry and business, qualifies Standard Conveyor to be of service to you.

Write for valuable reference book "Conveyors by Standard," Catalog No. F75.

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General Offices: North St. Paul 9, Minn.
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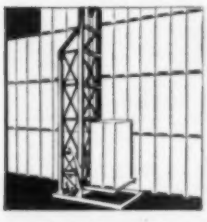
STANDARD
Gravity and Power
CONVEYORS



TIERING AND LIFTING MACHINES

PORTABLE PILERS

SPIRAL CHUTES

PNEUMATIC TUBE SYSTEMS

cess is located in the nearby physical metallurgy building. This laboratory, adequately equipped, makes castings from a variety of metals, some on a small scale production basis.

Another laboratory in this building is devoted to the study of stress relief of metals, a project which is nearing completion after several years' work. This investigation had for its original purpose the obtaining of accurate information upon which to base Navy specifications for the heat treatment of castings of Class B and similar composition. In addition, in was felt that much shorter heat treating cycles would be possible if the facts were known, thereby relieving congestion in furnace operations.

To conduct the stress tests a special and complicated machine was built. Instead of the usual creep testing apparatus, which measures strain at constant stress, this machine ascertains stress at constant strain for temperatures up to 800 degrees Cent., and its use permits accurate determination, for any metal, of the rate of stress relief for any practical temperature. For example, it has been found that Class B steel is almost completely stress free, regardless of initial stress, in 50 minutes at 650 degrees Cent. Second part of the study was to determine what minimum time cycle could be used to get the castings down to room temperature without re-establishing dangerous stresses. General results of this latter investigation indicate that castings cooled in still air at room temperature directly from the stress relieving temperature will not renew serious stresses. Further work is being done to establish the certainty of these observations.

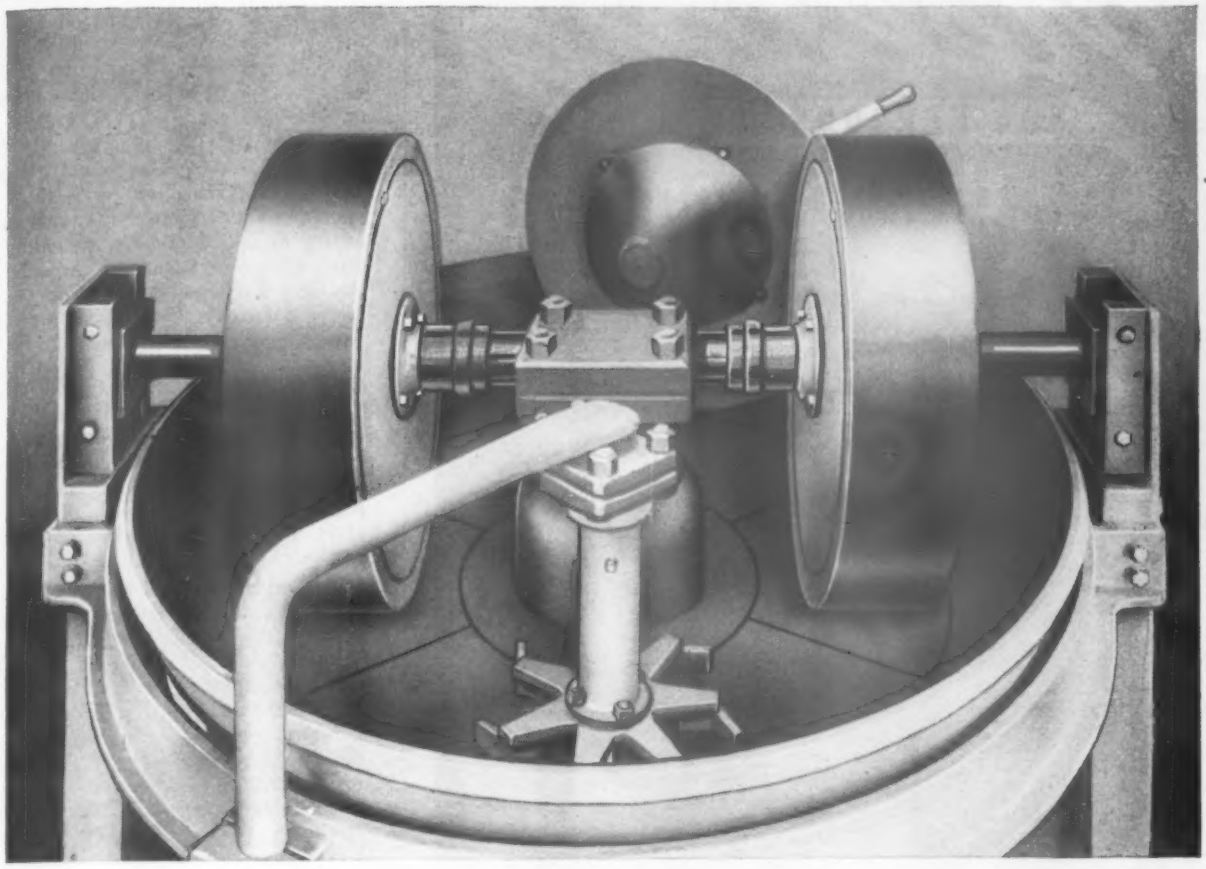
Investigate Feeding Problems

A study of even longer duration has been that of gating and risering steel castings. This is part of a general investigation of fundamental problems concerning the feeding of castings as it affects their internal soundness and overall integrity. At present, a long-term study is being made of the magnitude of the effect of variables—metal composition, metal temperature, mold configuration, mold materials, etc.—on rates of solidification of steel. Concurrently, a study is being conducted on the effective feeding range of risers on various sized casting sections.

Improved practice in both naval and commercial foundries has resulted from the research in steel castings, and the techniques and data developed now are being transposed to the nonferrous and cast iron fields. Probably the most significant development in experiments with nonferrous metals has been the use of gypsum insulating pads and riser sleeves to secure the adequate feeding necessary in production of sound castings. This development is expected to have an important influence on conventional practices and theories. The use of perforated iron screens at ingates to skim the metal and at the base of risers to facilitate

(*Concluded on page* 174)

WHAT DO YOU SEE IN THIS PICTURE?



This view of the Clearfield Mixer shows the general arrangement of the parts that work on the sand.

The revolution of the pan or container keeps all of the sand in constant motion. Passing beneath the mullers it causes them to revolve. The disc on the far side is also turned by the stream of sand, throwing it under the mullers and preventing it from adhering to the rim.

The part in the foreground is the agitator. It consists of a sleeve with fingers projecting radially at its lower end. It is free to revolve on a vertical shaft. Start the mixer and fill it with sand. The agitator starts going too. What happens? Well, there's a lively stream of sand shooting right at it. That's what makes it spin.

The little claw pieces you see on the "finger tips" are digging their way down through the sand for dear life, keeping the bottom plates scrubbed clean and the sand free from caking as a result of the muller pressure. They are also pulling material away from the center hub and throwing it out toward the rim, replacing it with sand drawn in from the outside, thus causing lateral diffusion.

At the same time the sand scraped off the bottom is being displaced by sand from the top of the mass, and that gives you vertical diffusion. Did you ever see a whirlpool? This is a whirlpool.

The agitator is making about three revolutions for every revolution of the pan and that's about eighty revolutions per minute. It's a tough spot for lazy sand. This gadget looks simple and is simple, but it does a whale of a mixing job.

Catalog 77 explains in detail some of the other features of the Clearfield Mixer. We have a copy for you.

CLEARFIELD
MACHINE COMPANY

CLEARFIELD
PENNSYLVANIA, U. S. A.

Melting
NON-FERROUS METALS
the efficient way
. . . safely

with . . .
HAUSFELD
FURNACES
Built for Service
FURNACES FOR
BRASS • ALUMINUM • MAGNESIUM
AND ALL OTHER
NON-FERROUS ALLOYS
The Campbell-Hausfeld Co.
300-320 MOORE ST. HARRISON, OHIO

(*Concluded from page 172*)

their removal also is being investigated in connection with brass and bronze.

Another study, this one in co-operation with the A.F.A., seeks to determine if the *electrical analogue method, developed at Columbia University, can be used to calculate heat distribution in molds.

This is only one of a number of instances in which the Naval Research Laboratory is carrying on work in co-operation with technical and trade groups of the foundry industry, including the Steel Founders' Society of America and the Gray Iron Founders' Society, as well as the A.F.A. A basic research program was started a short time ago in co-operation with the Cast Iron Research Committee of the Gray Iron Founders' Society, a study intended not only to increase the Navy's knowledge of cast iron but also to improve general foundry practices. A dilatometric study of the high temperature properties of sands and clays is being conducted in co-operation with Cornell University and the A.F.A.

Various members of the Steel Castings Section staff are active in committee work of the A.F.A. Howard F. Taylor is a member of numerous committees and subcommittees of the Steel Division and is chairman of the Elevated Temperature Foundry Sand Research Committee. Robert E. Morey is chairman of the A.F.A. Committee on Grading and Fineness, and Kenneth L. Clark is chairman of the Fluidity Committee. Other association committee members include Dr. B. M. Loring, head of the Nonferrous Section, the work of which will be described in a forthcoming issue of THE FOUNDRY.

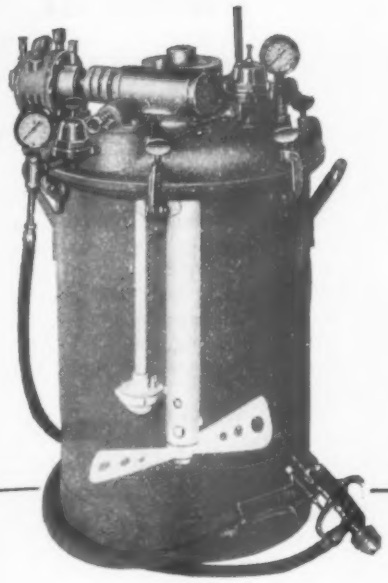
*"Heat Flow Problems in Foundry Work," by Victor Paschkis, *Transactions*, American Foundrymen's Association, 1944, p. 649.

Book Review

Industrial Electric Furnaces and Appliances, Vol. I, by V. Paschkis, cloth, 232 pages, 6 x 9 inches, published by Interscience Publishers Inc., New York. Price $4.90.

Intended as a contribution to place the present expansion of electric heating on a more rational basis, and to eliminate design by empirical methods, the author of this volume points out that the designer and user of industrial heating equipment must learn to think more in terms of uniform heat transfer to and from the object to be heated than in comparative terms of electricity or fuel, or of temperature control. Consequently, special emphasis is placed on thermal aspects of furnace design and operation especially in relation to uniformity of the product to be heated, and the frequently unrecognized interrelations of thermal and electrical factors associated with such equipment is stressed. Principles of design are discussed in detail and many types of practical furnaces are illustrated diagrammatically. Formulas also are included which should prove useful.

BETTER FOUNDRY EQUIPMENT

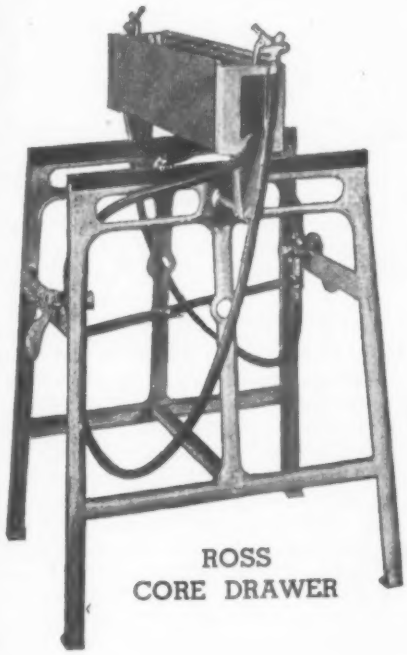


GAST CORE AND MOLD SPRAYER

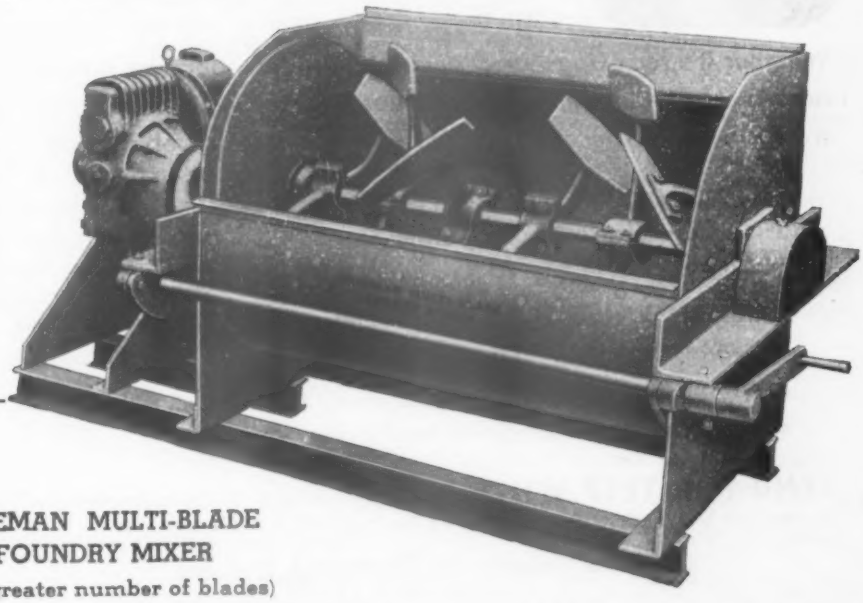
GAST CORE AND MOLD SPRAYER—This is a low-pressure, large jet atomizing sprayer, equipped with an air motor. It has a gear driven, paddle agitator for applying any type of wash to either green or dry sand molds or cores. It is regularly used with silica, naphtha or gasoline, talc and synthetic washes as well as the graphite or coke based materials. Wash is kept in suspension by paddle agitator when sprayer is used. Send for the whole story!

ROSS CORE DRAWER—If you are faced with a manpower problem (and who isn't?), remember that highly skilled labor is not required to draw cores on this machine and the more difficult boxes can be drawn just as fast as the easy ones. Many core boxes require no rigging at all. The Ross Core Drawer makes cores come true to size. Write for descriptive folder.

FREEMAN MULTI-BLADE FOUNDRY MIXER—Here is a mixer which has everything built-in as standard equipment, and includes many features not even available as accessories on other mixers. Send for a new booklet which explains how differently this mixer is built and just what you may expect of its operation in your plant.



ROSS
CORE DRAWER



FREEMAN MULTI-BLADE
FOUNDRY MIXER
(Note greater number of blades)

The Freeman Supply Company

Pattern Shop & Foundry Supplies & Equipment

Mahogany and Pine Pattern Lumber

1152 East Broadway TOLEDO 5, OHIO Tel. TAylor 4624

Millions of whirling abrasive wheels, trained in war's tough school of precision finishing, each doing a prime job in laboratory, tool room, aboard ship, on production line. And —they're all set and eager to tackle civilian goods when peace machinery is singing again.

Whether it's removing burrs, smoothing edges, squaring surfaces so accurately that the finish can be measured in micro inches, or cut-off work—there's a Chicago ready to do a top-ranking job for you.

VITRIFIED GRINDING WHEELS with a 50-year pedigree. Up to 3" in diameter in various abrasives and bonds including the famous FV Bond.

MOUNTED WHEELS. The largest assortment made with a shape and abrasive to take care of every internal and external finishing job.

CUT-OFF WHEELS. All types and sizes. Now offered with the sensational new special-formula RT Bond (rubber or resinoid).

SEND FOR TEST WHEEL... Learn first-hand about Chicago's superiority. Tell us what you have to finish, size wheel you'd like and we'll mail one promptly.

Send Coupon for illustrated Catalog

CHICAGO WHEEL & MFG. CO.

1101 W. MONROE ST., DEPT. FD, CHICAGO 7, ILL.

★ Half a century of specialization has established our reputation as the Small Wheel People of the Industry.

Send Catalog. Interested in ☐ Grinding Wheels ☐ Mounted Wheels ☐ Cut-off Wheels ☐ Send Test Wheel. Size _____

Name _____

Address _____

PRESSURE CASTING MATCHPLATES

(*Continued from page* 100)

readily is obtained. This wet mixture is poured into the recess containing the pattern, slightly above the level of the top of the unit flask, and allowed to set. Before it is completely set, a straight edge is drawn across the top to remove excess. Setting time usually is from 15 to 25 minutes.

When this half cast, or drag, is set and hardened, it is turned over so that the pattern is visible. Once again the unit flask is built up and another mixture made and poured on top of the drag mold, following the procedure described.

After this has set and hardened, the two halves are parted so the pattern may be removed. Clamped back together, the two half molds have within them a cavity the exact form of the pattern. This performance is repeated until the required number of unit molds is produced. These unit molds are then scored on four sides and bottom to assure bond and arranged in the master flask.

The master flask is not standard equipment but is made in accordance with individual specifications and design of the user. The practice has been to pour these molds flat from the side, and the master flask design should allow for this feeding practice.

Units Bonded with Plaster

Placed in the master flask with space around each unit mold to permit the plaster mixture to flow and bond, the mixture is poured into this recess in the master flask. After the mixture has set and hardened, the drag half of the composite master mold is completed.

This drag half is turned over and the unit cope halves are placed on each corresponding mate after being scored as previously described. The cope half of the master flask is placed on the drag composite mold and into this recess the plaster mixture is poured and allowed to set and harden.

When this composite mold cope and drag are parted, the runners and gates into which the molten metal is to flow are cut in the mold. The two halves are placed in the oven for baking. Baked at 300 degrees Fahr. for about 5 hours or at 400 degrees for about 3 hours, they are then allowed to cool slowly. While still warm, the molten metal is poured into them.

This mold is porous enough to permit the escape of gases usually generated by fluid metals and will resist exposure to the heat necessary to dry it, as well as to the heat of the fluid metal poured into it, without being fractured or cracked.

The pressure equipment consists of:

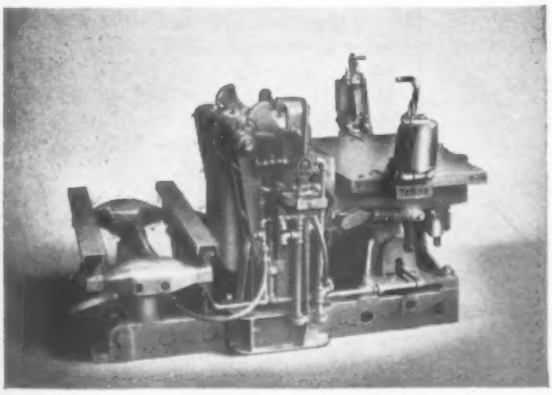
1. Steel plates top and bottom capable

(*Continued on page* 178)

30" Shockless-Jar, Rollover and Pattern Draw Machine. 30" x 40" Rollover Plate. 12" Draw.

TABOR
TRADE 1884 MARK

TABOR JAR, POWER ROLLOVER POWER PATTERN DRAW MACHINES



22" Plain-Jar, Rollover and Pattern Draw Machine. 22"x42" Rollover Plate. 10" Draw. Equipped with air-operated Flask Clamps.

Tabor machines handle jobs up to their full rated capacity in a matter of seconds for a complete operating cycle. Ramming time is reduced to a minimum by the efficient Tabor jarring member . . . Rollover is oil controlled for maximum speed with absolute safety . . . Automatic leveling device eliminates possibility of shift . . . Draw is smooth at any desired speed by air-on-oil, and is accurate throughout the life of the machine.

Tabor Jar, Rollover Pattern Draw Machines are furnished in all practical sizes; plain-jar or shockless-jar; with or without air-operated flask clamps. Bulletin 424 illustrates and describes the complete line.

FLASK LIFT MACHINES • SQUEEZERS AND JAR SQUEEZERS • JARRING MACHINES • TABOR-BRASIVE CUT-OFF MACHINES • ROLLOVER MACHINES

Since 1884 . . . MANUFACTURERS OF FOUNDRY MOLDING MACHINES

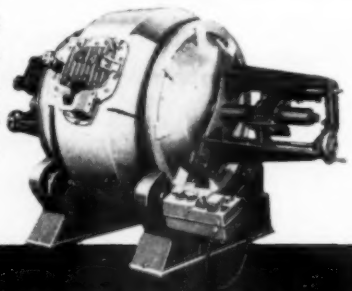
THE TABOR MANUFACTURING CO.

6225 TACONY STREET — **PHILADELPHIA 35, PENNSYLVANIA**

Representatives: Snyder Foundry Supply Co., Los Angeles, Calif.; Carl F. Miller & Co., Seattle, Wash.

8 TO 16 HEATS IN 8 HOURS WITH A DETROIT ELECTRIC FURNACE

Outstanding engineering and design principles assure volume production with a Detroit Rocking Electric Furnace—as many as 8 ferrous or 16 non-ferrous heats in one 8-hour day. These modern, speedy units likewise assure quality, for they provide automatic stirring action under non-oxidizing conditions and precise control over time, temperature, and composition. Their closed-chamber construction together with the absence of combustion products reduces dirt and fumes to a minimum. They save both labor and material. Versatile, flexible, fast, Detroit Electric Furnaces are a sound investment in economical production of high quality castings. Available in seven sizes with capacities from 10 to 8,000 lbs. Write for complete facts.



DETROIT ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY • BAY CITY, MICHIGAN

(*Continued from page* 176)

of being clamped tightly to prevent the mold from breaking when pressure is applied to the fluid metal.

2. A cylinder or reservoir which can be attached to the top plate and designed to contain sufficient metal to fill the mold.

This cylinder or reservoir must be secured to the top plate in such a manner as to prevent the escape of fluid metal when air pressure is applied.

3. The cylinder or reservoir head or cover should have a gasket or similar seal to prevent escape of fluid metal when air pressure is applied to the cylinder. Attached to the head or cover are means of applying the air pressure which can be admitted through a hose in the head or cover.

4. A gage should be attached to the air line to indicate the pressure.

5. Lugs and bolts with wing nuts have been found suitable for securing the cylinder to the top plate, as well as securing the head or cover to the cylinder.

The cylinder or reservoir usually is over the sprue hole, which is covered by an asbestos paper disk about 1/16-inch thick.

The cylinder or reservoir may be lined with heavy asbestos paper about ⅜-inch thick or lined with fibrous magnesium silicate-plaster mixture which has been thoroughly baked and all moisture expelled therefrom.

Strips Separate Cope and Drag

Before the mold is poured the cope and drag are separated by metal strips around the outline of the plate and allowance made for pouring from the side. These strips are of the desired plate thickness. Precaution should be taken to prevent any possible escape of metal when the air pressure is applied.

Molten metal is ladled into the cylinder or reservoir until it contains a sufficient amount for the casting. Because of the insulating qualities of the plaster molds made in this manner, the metal is poured at a temperature below that used in ordinary sand casting.

When the metal reaches the proper pouring temperature, the cylinder head or cover is securely fastened and the air pressure applied.

At between 5 and 10 pounds air pressure the asbestos disk breaks and usually is indicated by the wavering of the needle on the gage indicator. The metal immediately is forced into all sections of the mold cavity. Air pressure then is reduced and held at 5 pounds until the metal has set. The air pressure is released and the metal allowed to cool. The casting is removed from the mold, the gate sawed off along the side, and the matchplate is ready for use.

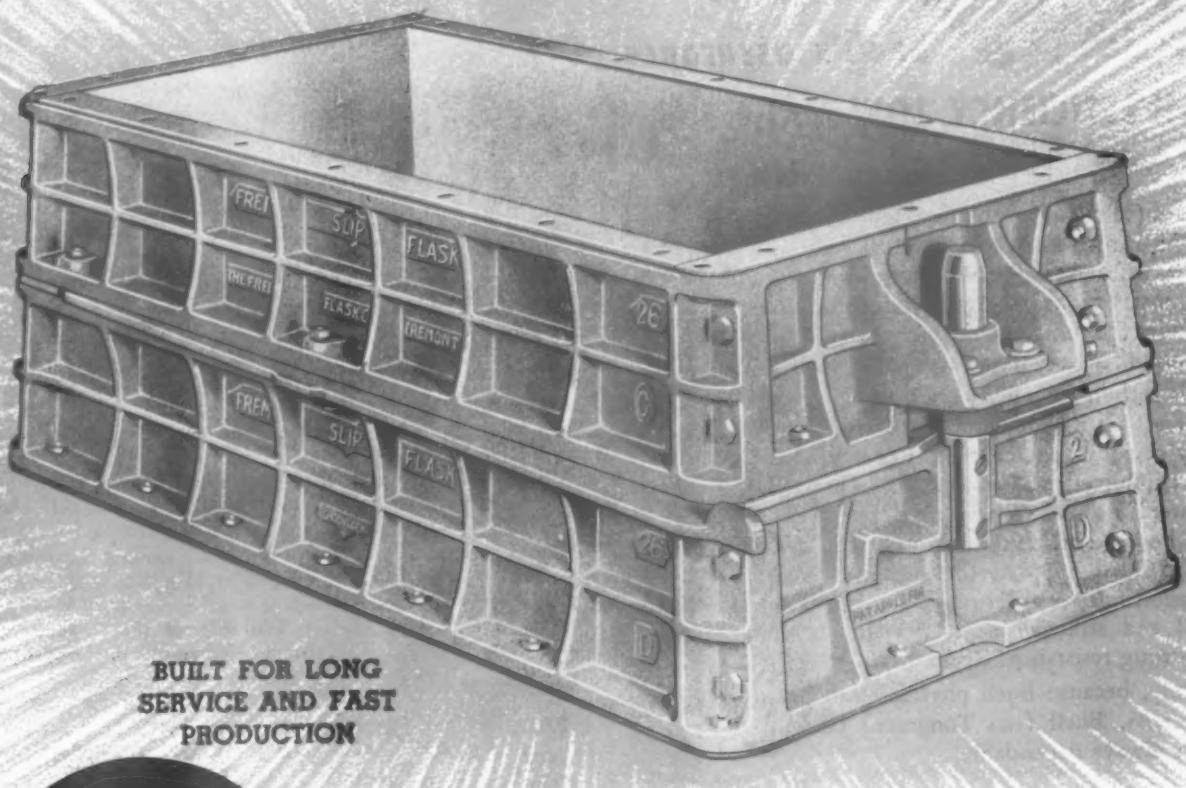
Precaution should be taken to break and remove the sprue from the casting and the cylinder head before the metal sets too hard.

Matchplates made in the manner outlined are perfect in detail and extremely accurate, free from shifts and result in castings with the parting line barely

(*Concluded on page* 180)

STURDY! LIGHT! ACCURATE!

FREMONT MAGNESIUM FLASKS

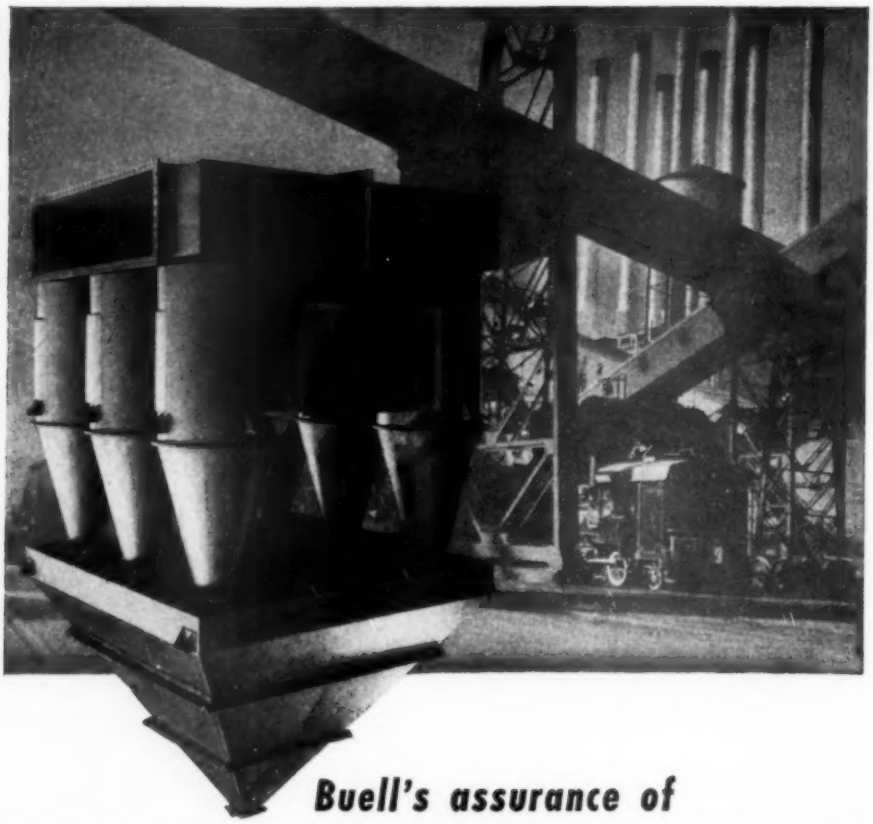


BUILT FOR LONG SERVICE AND FAST PRODUCTION

GROOVLOCK
THE FOOL-PROOF PIN

THE FREMONT FLASK CO.,
Fremont, Ohio

EXTRA STURDY CONSTRUCTION



Buell's assurance of

HIGH EFFICIENCY, LOW MAINTENANCE, LONG LIFE

BUELL (van Tongeren) Dust Collectors have been in use for five or more years without a failure, without the replacement of a part. Many installations having been in continuous use under the most exacting operating conditions and at high working temperatures.

This recognized ability to withstand wear, heat and vibration is due to Buell's extra-sturdy construction. Fabricated of extra thick steel, completely seal-welded inside and out, with welds ground to a flush smooth surface, Buell bodies and cones are as "tight" as a casting. Buell hoppers, for example, have a reputation for especially rugged construction; braced and stiffened with 3" channels that offer strong resistance to vibration.

Finally, because Buell provides this *needed* ruggedness, Buell (van Tongeren) performance is always dependable.

BUELL FEATURES

SHAVE-OFF
LARGE DIAMETERS
EXTRA-STURDY CONSTRUCTION
CORRECT HOPPER DESIGN
SPLIT-DUCT MANIFOLDS
INNER WELDS GROUND SMOOTH

RESULT IN

HIGH COLLECTION EFFICIENCY
LESS FAN BLADE WEAR
LOW DRAFT LOSS
LOW POWER CONSUMPTION
HIGH TEMPERATURE RESISTANCE
UNLIMITED CAPACITY
NO MOVING PARTS
FREE DUST FLOW

PRODUCE

HIGH EFFICIENCY
LOW MAINTENANCE
LOW OPERATING COST
LONG LIFE
NO CLOGGING

buell
DUST RECOVERY SYSTEMS

Engineers and plant executives will find much of interest in Buell's 32-page book:
"The van Tongeren System of Industrial Dust Recovery"
BUELL ENGINEERING COMPANY, INC.
14 Cedar Street, New York 5, N. Y.
Sales Representatives in Principal Cities

DESIGNED TO DO A JOB, NOT JUST TO MEET A "SPEC"

(*Concluded from page* 178)

noticeable. These matchplates are really die cast in plaster dies.

Intricate patterns having great detail are accurately made as easily and as quickly as those having very little detail.

Skilled molders are not necessary. Persons of both sexes quickly can become expert in making plaster molds. Plaster molding has greater appeal than sand molding and is preferred by workers because working conditions are cleaner. Plaster molds require less heavy work and are free from ram offs and jagged parting lines.

GRAY IRON TENSILE SPECIMENS

(*Continued from page* 95)

numerous variations. It is obvious that if the threads deformed equally around the circumference, and if the heads of the testing machine were perfectly rigid and moved apart parallel to each other, no eccentric loading of a specimen would be possible. But such ideal conditions do not exist in practice, and if all parts of the specimens are not co-axial some eccentricity is bound to result. Some specimens of this character were tested and the results were reported briefly in THE FOUNDRY for May, p. 153.

Further details of the tests just mentioned are given here for the purpose of indicating some of the nonuniform conditions which are likely to occur. Six bars 12 inches long were cut into three specimens each, machined and tested. The specimens were prepared with eccentricities (e) of 0.0, 0.06 and 0.11-inch, one from each bar. In order to minimize the differences between the ends and middle portion of the bar, they were cut as indicated in Fig. 2 (a). The specimens were of the size and shape shown in Fig. 2 (b). These were tested with screw threads in parallel planes, the specimens being screwed for a length of one inch into loading pins which were clamped rigidly into the heads of the testing machine; there was practically no flexibility of the loading apparatus. The detailed results of the tests are shown in Table I.

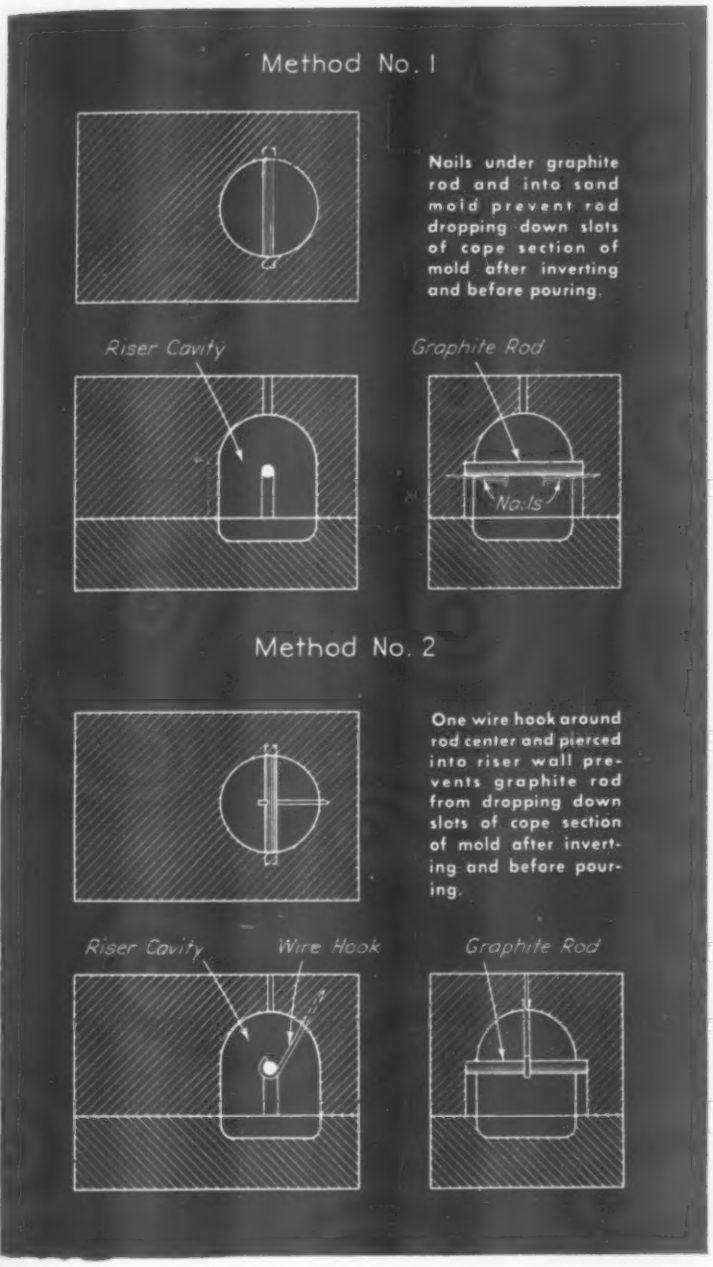
Since the stress on the outermost fiber would be doubled with an eccentricity of 0.05-inch and since there was only a reduction in strength of 4.1 and 14.9 per cent for eccentricities of 0.06 and 0.11-inches, respectively, it seems clear that the material was not sufficiently uniform to give satisfactory results or else there was actually much less eccentricity present than was assumed to exist.

Tests were also made in which a different method was used to produce eccentric loads. The specimens were rectangular in cross section, being obtained from the walls of a cast iron water pipe.

(*Concluded on page* 182)

For Your Information...

HOW TO USE "NATIONAL" GRAPHITE RISER RODS


Method No. 1
Nails under graphite rod and into sand mold prevent rod dropping down slots of cope section of mold after inverting and before pouring.
Riser Cavity
Graphite Rod
Nails
Method No. 2
One wire hook around rod center and pierced into riser wall prevents graphite rod from dropping down slots of cope section of mold after inverting and before pouring.
Riser Cavity
Wire Hook
Graphite Rod

IT HAS BEEN shown not only that steel is saved, but that sounder castings result, when "National" graphite riser rods are used in either blind, semi-blind or open risers.

Two of the most satisfactory methods of holding graphite rods in risers are presented in the accompanying illustrations and text. Correct rod sizes vary with the riser sizes; our representatives will be glad to discuss size recommendations with you. But a major point to remember is that "National" graphite rods help make sounder castings.

In blind and semi-blind risers, the use of graphite rods results in a lower melting point and higher temperature in the riser metal, which makes for slower freezing and increased flow into the castings. Moreover, the shrink cavity becomes flat-bottomed, making possible shorter risers, saving in metal, and lower cutting and grinding costs.

In open risers, internal gas pressure under the solidified metal forces more metal into the castings, thus making them sounder. Here also riser dimensions are reduced, metal saved and cutting and grinding costs lowered.

For profitable information on many other specialty applications of "National" graphite and carbon and "Karbate" products, write to our nearest Division Office for Catalog Section M-8000-A.

The words "National" and "Karbate" are registered trade-marks of National Carbon Company, Inc.

KEEP YOUR EYE ON THE INFANTRY . . .
THE DOUGHBOY DOES IT!

NATIONAL CARBON COMPANY, INC.
Unit of Union Carbide and Carbon Corporation
UCC
General Offices: 30 East 42nd Street, New York 17, N. Y.
Division Sales Offices: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco

ELIMINATE
DOUBT & DELAY

If your problem involves the meeting of production requirements ON TIME, ACCURATELY and ECONOMICALLY, you MUST eliminate doubt and delay. NIAGARA FALLS SMELTING & REFINING CORPORATION blasts these gremlins regularly with a sure-fire, double-barrel attack. First, we prepare the alloy to positive specification—every pound is identical in quality and composition. Second, we can make deliveries to conform to the most critical production schedules. Our files of complete, accurate alloy research information are at your disposal, together with the services of our technical staff. Let us know the specifications of the alloy you need, WHERE and WHEN—we'll do the rest.

Our Telephone Number It's Buffalo Riverside 7812-3-4

NIAGARA FALLS SMELTING & REFINING CORPORATION
America's Largest Producers of Alloys
BUFFALO 17, NEW YORK

(*Concluded from page* 180)

and the loads were applied by means of pins through holes drilled at certain distances from the central axis of the specimens. The dimensions of the specimens are given in Fig. 3. Two of the five specimens had holes on the axis and three had holes 0.15-inch from the axis. The eccentricity of 0.15-inch was chosen because theoretically it gave no stress on one side of the specimen and double the average stress on the other side. Two gage lines with a gage length of 4 inches were placed on each face of each specimen and strain measurements were made with a removable strain gage on each of the four gage lines. The stress-strain curves for the five specimens are shown in Fig. 5.

The strains on the two gage lines on each side of the specimen were averaged and these averages are the ones plotted. It will be seen that the average strains are in accord with theory to the extent that there is practically no strain on one side and that the strain increases rapidly on the other side. The average tensile strain at failure, obtained by extrapolation, is 0.0060 and 0.0068 in. per in., respectively for the axial and eccentrically loaded specimens. A summary is given in Table II.

Value Modified Slightly

Theoretically, there should be a reduction of 50 per cent in the ultimate strength, but this value would be modified slightly by the deflection of the eccentrically loaded specimen: Calculations show that the deflection due to the eccentric load would probably not exceed about 0.01-inch or about 6 or 7 per cent of the initial value. This would leave a theoretical reduction in the ultimate strength of about 43 per cent. From Table II it is seen that there is an actual reduction of only about 27 per cent. The difference between 43 per cent and 27 per cent must be due to a difference in the strength of the material or to the distribution of stress across the specimen, or both. The assumed distribution of stress is shown in Fig. 4 (a), but the actual distribution is probably more like that shown in Fig. 5 (b). While it is true that there is not much plastic action in gray cast iron, there is apparently enough to distribute the load a fairly considerable amount.

To sum up: The data show a substantial reduction in the loads carried by gray cast iron bars under eccentric loads, as compared with the loads carried under axial loads. The exact amount of this reduction is affected by so many conditions that it cannot be stated with certainty. Therefore, it seems clear that there is a place for a fairly extensive investigation of the plastic action of gray cast iron in adjusting itself to eccentric loading. Such a study would be in accord with the present trends to produce gray cast iron to meet specific requirements and to design machine parts of it with a greater degree of exactness than has commonly been the practice heretofore.

Ransohoff Automatic Star-return WET CLEANING MILLS

SHARPEN YOUR PENCIL ON FOUNDRY COSTS

More than ever, foundries must scan cost-sheets with microscopic care . . . for competition is sure to reach fever heat as industry faces the cold, hard facts of conversion and re-conversion. Your best bet is to install proved equipment which will save time, labor and money. BEST WAY TO ECONOMIZE IS TO MODERNIZE.

END-LOADING END-UNLOADING MILL

SAVE 30% to 70% ON YOUR CLEANING COSTS

SIDE-LOADING SIDE-UNLOADING MILL

TWO TYPES . . BOTH EQUALLY EFFICIENT

In the end-loading end-unloading mill (top photo) work cascades with the stars. In the side-loading side-unloading mill (lower photo) the work moves moderately in the cleaning compartment completely surrounded by a moving mass of stars.

RANSOHOFF WET METHOD

Here's the success-story and reason-why: The work cascades in a mass in which stars are intermingled thoroughly so as to fill all voids completely. Stars of varying sizes and shapes enter and return automatically. This results in very rapid cleaning without nicking, breaking or self-destructive mill wear. Replacement costs are minimum. Dust and dust collectors are eliminated, health hazards reduced.

SEND US A SAMPLE BATCH

SPEEDY . . . GENTLE . . . EASY . . .
AUTOMATIC HANDLING OF STARS . . .
NOT SELF-DESTRUCTIVE . ECONOMICAL

N. Ransohoff, Inc.

MANUFACTURER'S ASSOCIATION, INC. FOUNDRY EQUIPMENT

TOWNSHIP AVE. AND BIG 4 RR · CINCINNATI 16, OHIO

NEW EQUIPMENT and SUPPLIES

(1)—AIR FILTER: American Air Filter Co. Inc., 215 Central Ave., Louisville 8, is introducing a self-contained electronic air filter designed to collect oil mist from high speed cutting tools or welding fumes in light concentrations. The unit employs an ionizer to give an electrical charge to mist and smoke particles before the latter pass into the collector unit where they are precipitated on the plates. Features include a removable panel to give full access to all parts, which are easily removed; complete protection of the operator against electrical shocks; and easy removal of the filter and ionizing units for washing or inspection. The collector is made in one size —28¾ x 20¾ x 70 inches high.

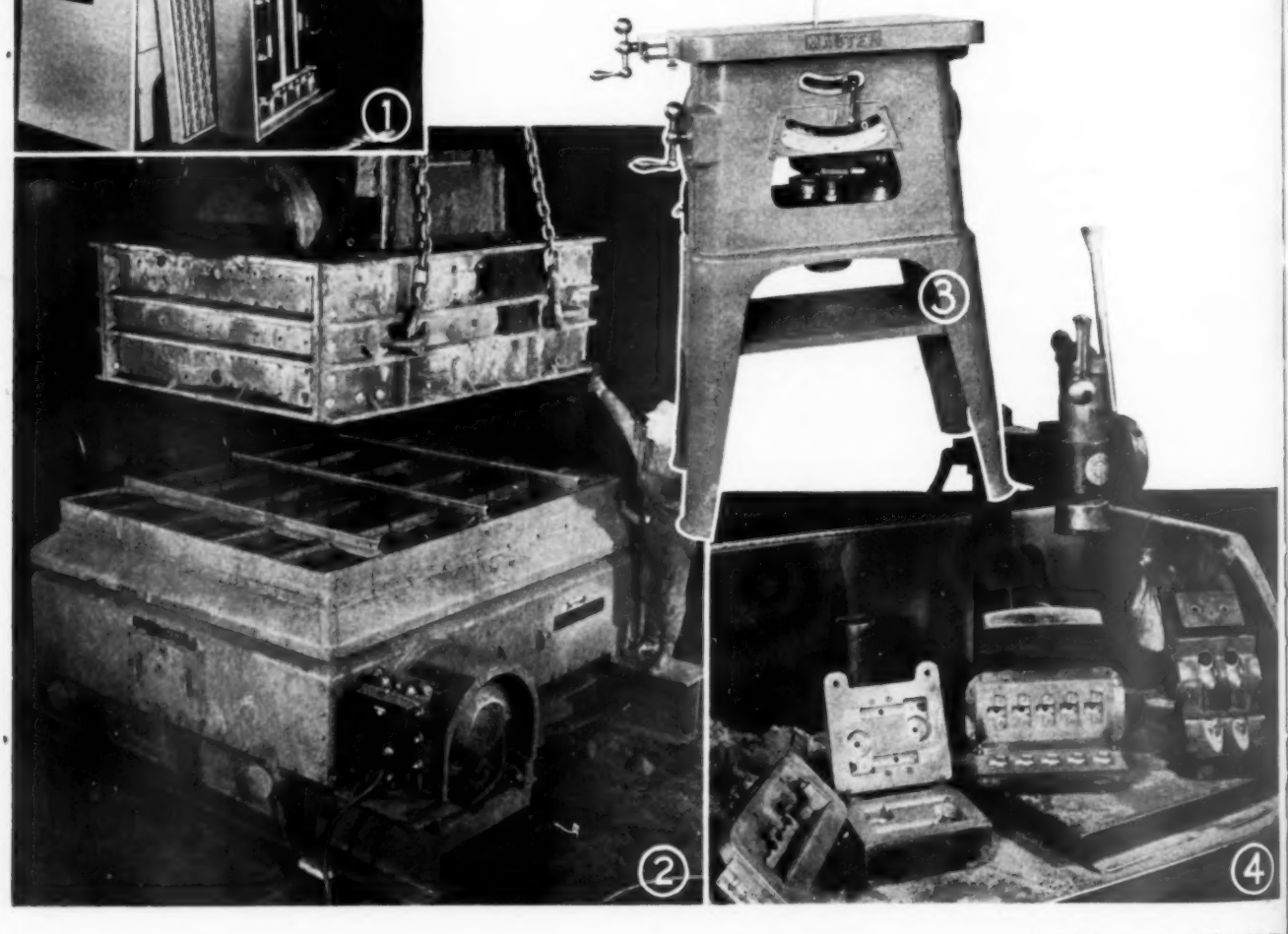
1

(2)—SHAKEOUT: Allis-Chalmers Mfg. Co., Milwaukee, announces two new single unit shakeouts. The larger 8 x 10-foot, 25-ton load unit shown here is designed to handle 90 per cent of the tonnage cast in the average jobbing foundry, where castings range from 500 to 50,000 pounds each. The smaller 6 x 8-foot unit is rated 15 tons capacity. Important features claimed for the new shakeouts are lower initial and operating costs, greater capacity, and space savings. Vibratory action is produced by the combined effect of a heavy duty eccentric shaft (offset and enlarged between the bearings) and two balance wheels which counterbalance the weight of the shakeout. Impact loads are absorbed by resilient support springs at each end of the shakeout. Use of a short shaft and elimination of outer bearings permits handling of large loads on single units.

(3)—SPINDLE UNIT: Kindt-Collins Co., 12651 Elmwood Ave., Cleveland 11, has developed a spindle machine which can be used either with a wide variety of milling cutters to machine wood and soft metals, or with various sizes of abrasive sleeves as a spindle sander. Its spindle oscillates for sanding work, and is non-oscillating for milling work. The unit uses standard milling cutters, or abrasive sleeves ranging from ¼ to 1-inch diameter, with various special fixtures available to make exact duplicates of certain shapes. Spindle speeds are 3500, 5000 and 7000 revolutions per minute, developed by a ½ horsepower motor. The spindle tilts to 45 degrees. In pattern shops, the new machine is used in making segments, tapered ribs, parallel ribs, core prints up to 10½-inch diameter, and in precision sanding of pattern parts.

(4)—CORE BLOWER: Redford Iron & Equipment Co., 21315 West McNichols Rd., Detroit 19, is offering a simple and flexible cartridge bench core blower, which is said to result in sharply

(*Continued on page* 186)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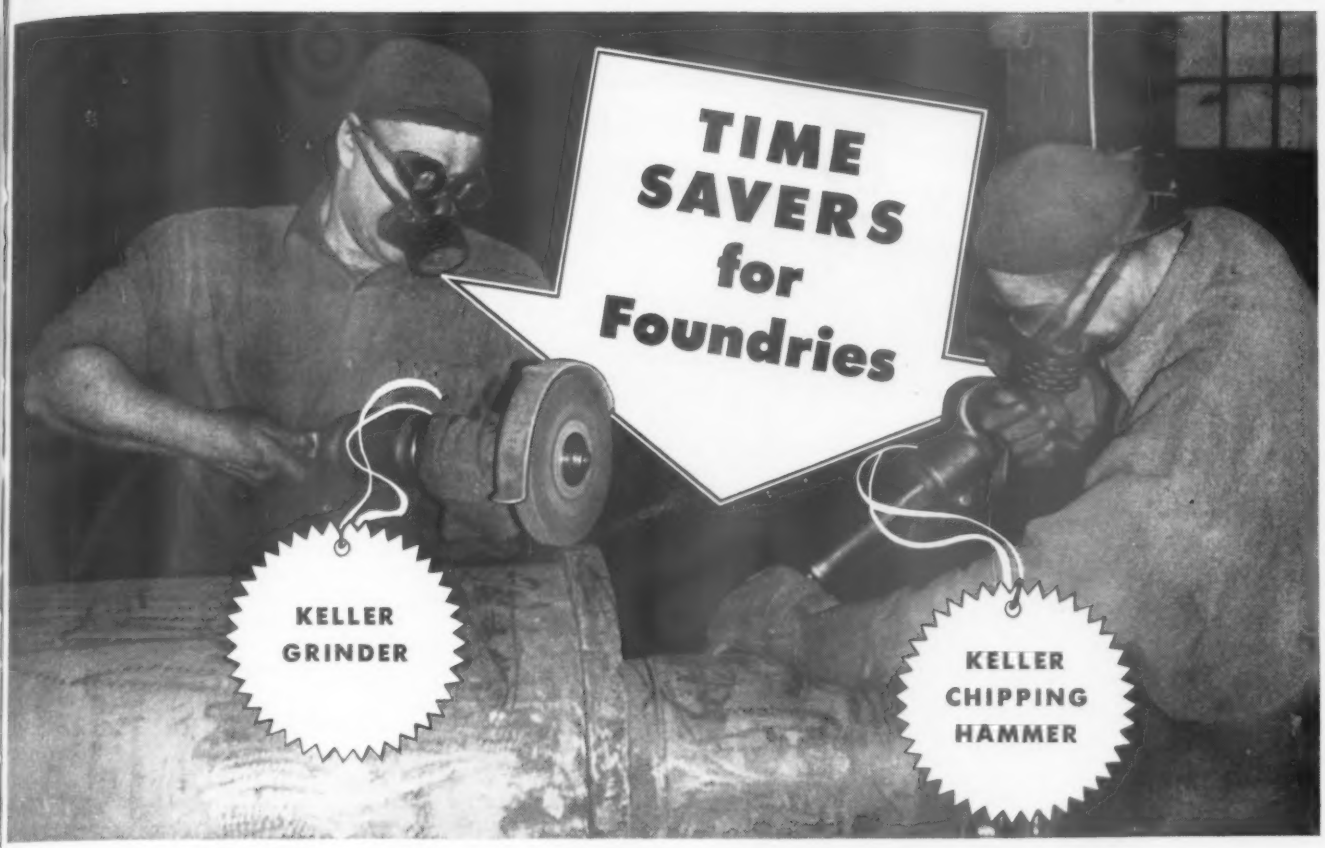
4



Keller offers the skilled foundry workman a complete selection of grinders, chippers, and sand rammers from its pneumatic tool line. A few of these foundry tools are illustrated on this page. They are sturdily built tools, backed by over 25 years of pneumatic tool-making experience. Other pneumatic tools to be used in foundry work are described and illustrated in Catalog No. 11. Send for it.

CHIPPING HAMMERS

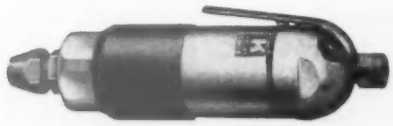
A type and size for every foundry need. Over 30 models. Long-lived tools that stay on the job with a minimum of maintenance.

FLOOR AND BENCH TYPE RAMMERS

Bench rammers for light work; floor rammers for heavy work. Perfectly balanced. Operator merely guides them without exerting pressure. Keller rammers provide better cores and castings, with fewer rejects. They are speed production tools.

ROTARY GRINDERS

Grinders for every purpose . . . from pattern shop to finished castings. Horizontal grinders . . . for grinding wheels from 2 in. to 8 in. in diameter; vertical grinders in 7 in. and 9 in. sizes; burring tools and reciprocating saws for removing burrs and fins from aluminum alloy castings.



ROTARY DIE GRINDERS

Small, powerful grinders for wheels from ¼ in. to 1¼ in. diameter. Useful in pattern shop and for finishing small castings.

Send for Catalog No. 11.

KELLER

Pneumatic Tools

KELLER TOOL COMPANY • 4507 LAKE ST. • GRAND HAVEN, MICH.

"SPOT" YOUR COMPRESSORS
FULLER ROTARY COMPRESSORS AND VACUUM PUMPS
BUILT FOR CAPACITIES TO 1800 C.F.M. PRESSURES TO 125 LB. VACUUMS TO 29.00 IN. REFERRED TO 30 IN. BAROMETER
FULLER
FULLER COMPANY

Why — excessive floor space and heavy, costly foundations?

Fuller Rotary Compressors require very little floor space in relation to capacity, have no vibration, and consequently require comparatively light, inexpensive foundations.

The installation illustrated above—two Fuller Rotary Two-stage Compressors, with individual motors, capacity each 750 c.f.m. free air, compressing from atmosphere to 100-lb. gage, were placed on foundations which formerly supported two conventional type machines with a capacity of 250 c.f.m. each, 100-lb. pressure . . . THREE TIMES the capacity on the same foundations!

"Spot your compressors . . . have air when, where and as you need it."

Bulletin C-5 illustrates and describes these machines. It's yours for the asking.

FULLER COMPANY
CATASAUQUA, PENNSYLVANIA

Chicago 3 · 1144 Marquette Bldg.
San Francisco 4 · 421 Chancery Bldg.
Washington 5, D. C. · 618 Colorado Bldg.

No. 4 of a series

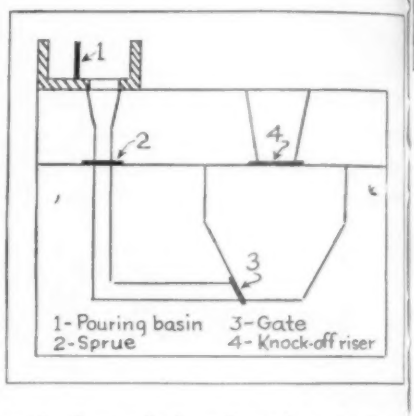
C-112

FULLER
PIONEERS OF HIGH-EFFICIENCY ROTARY COMPRESSORS

(*Continued from page* 184)

higher production than by hand ramming in making small cores. A ¾-inch air line with 80 to 120 pounds pressure is sufficient to make cores in single or gang boxes requiring a maximum of 2 pounds of sand. Coreboxes of different height, size or shape may be interchanged instantly by adjusting the stop and operating handle on the machine. The cartridge is made a part of the corebox equipment and is loaded by plunging it into a pile of sand on the bench. It then is located on the corebox by means of dowels or stops, being inserted between the box and the air reservoir of the machine. The operator keeps corebox and cartridge sealed by holding down the pressure handle with the right hand while the left hand operates the blow valve. After the core is blown, the box is pulled forward, the cartridge is lifted off, and the work of drawing the core is completed on the base of the machine. The unit is designed to require a minimum of maintenance, the only wearing part being the rubber cartridge sealing disc, which can be replaced quickly.

METAL FILTER: Briggs Clarifier Co., 1339 Wisconsin Ave. N. W., Washington 7, has developed a new type strainer or filter for nonferrous metals



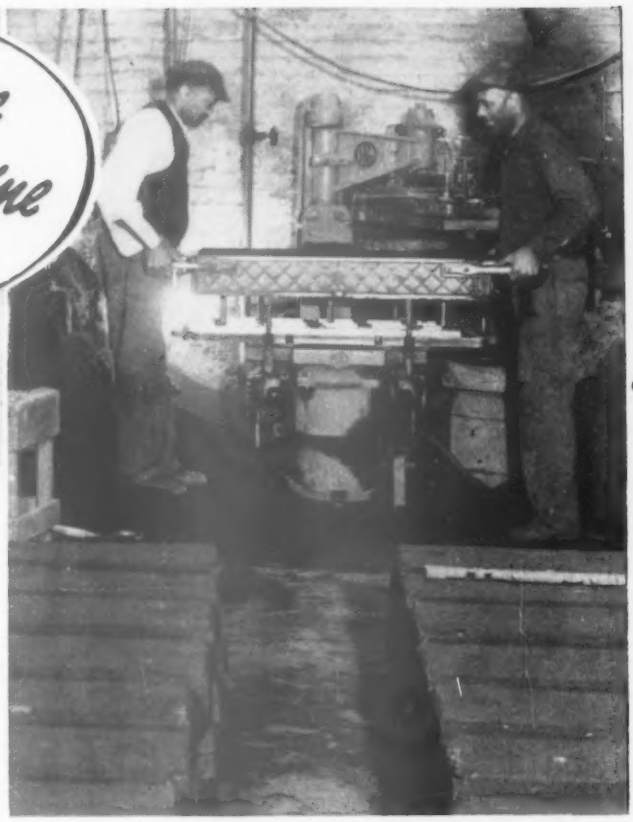
and alloys which will withstand severe heat shock and temperatures up to 2500 degrees. It is composed of a metal screen coated with refractory material which may be used in various locations in the mold as indicated on the accompanying sketch. Advantages claimed include: Clean metal into casting due to retention of dross and slag; controlled feeding of metal into mold which reduces splashing and turbulence; permits knocking off gate or riser with blow of sledge when used at the base of those units; casting may be poured through riser, in many cases eliminating gate and sprue, and permits sprue or riser to be kept filled easily.

SWEATBAND: American Optical Co., Southbridge, Mass., announces an absorbent sweatband, specially designed for foundrymen, welders and all workers on hot jobs. The sweatband, made from synthetic sponge, 7¼ in. long, helps reduce the possibility of accidents result-

(*Continued on page* 190)

All these features Make a GOOD Molding Machine

1. Speed—production
2. Accurate molds
3. Easy to operate
4. Versatility
5. Stamina—long life
6. Compactness
7. Few working parts
8. Negligible maintenance

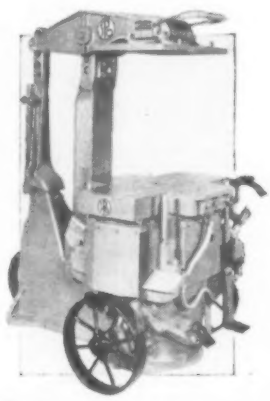


Why emphasize these particular points? Just what do they mean in actual foundry terms? Well, let's see:

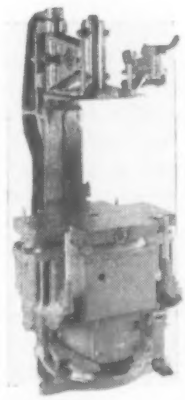
To be brief, they assure you of high production, molds true to pattern, easy "learnability" for beginners, ability to handle a wide variety of work at a profit, and long, trouble-free performance.

Before the war, now and for post-victory purposes, these qualities have been and will remain essentials. *SPO Molding Machines have them all.* Whatever your exact requirements, the SPO engineering staff is ready to study them carefully, applying our many years' experience as practical foundrymen, with a view to giving you the one right machine or combination of machines for your needs.

We shall be glad to send you a bulletin on the SPOs shown here or on any other series



SPO No. 200 Series, jolt squeeze strippers, post type. Real production machines adjustable to a wide range of flask sizes and shapes.



SPO No. 200 Series, jolt squeeze strip machines, cantilever type. Profitable for jobbing and fast production of cope and drag molds.

SPO No. 100 Series, jolt squeeze strip machines, cantilever type. Fast and flexible, for producing a wide range of matchplate molds.

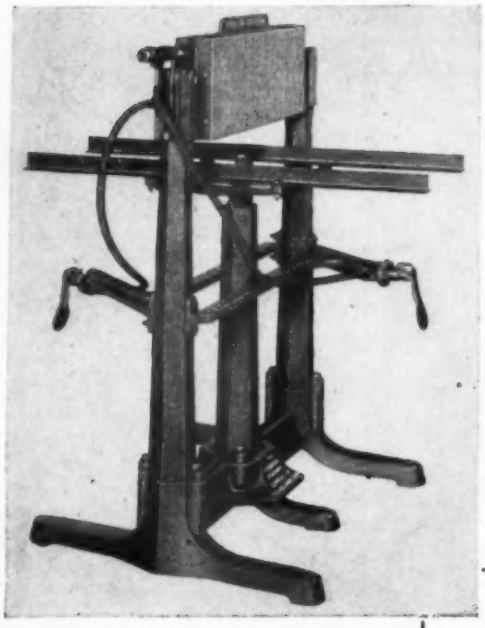
SPO

MEMBER MANUFACTURERS' FOUNDRY EQUIPMENT ASSOCIATION, INC.

INCORPORATED

Manufacturers and Specialists in Molding Machines, Vibrators and Patterns for Production

7500 GRAND DIVISION AVENUE • • CLEVELAND 5, OHIO



FEDERAL SU

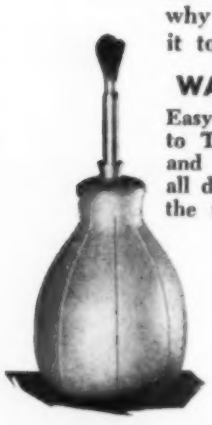
TUNGSTEN-CARBIDE BLAST NOZZLES

Cut Cleanings Costs! Reduce Your Air Costs! Cut Shut-down Time! Clean Faster and Better! You can do all these things simply by installing Federal Blast Nozzles in your cleaning equipment. Buy and install one—prove it in your own plant.

THE VIBRA-DRAW CORE DRAWING MACHINE

The ideal machine for drawing more cores and better cores than you've ever had before. The separate center stand which supports the core tray is not affected by vibration of the drawing head. Core makers draw successive cores on same core tray without shaking down cores already drawn.

The VIBRA-DRAW drawing head has 100 accurately machined grooves on each side—accommodates two core makers and ensures an accurate lift for the entire height of the draw. Our new circular tells all about it—why not write for it today?



WATER BRUSH

Easy to Grip and Hard to Tip. It can't leak and one filling lasts all day. Does not tire the molder's hand.

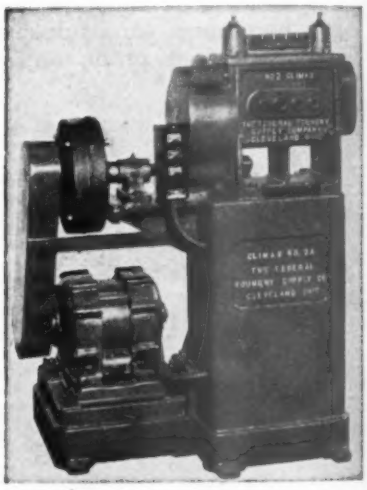
"The Twist Does The Trick"

TWISTED STEM CHAPLETS

The chaplet with everything. The "Twisted Stem" promotes rapid complete fusion. Not deformed, the stem has no weak spot to burn in and permit core shift. Made in a complete range of sizes. Samples of the size you use, gladly submitted.

CLIMAX WIRE STRAIGHTENERS

Any foundry, large or small, can cut production costs by straightening and re-using core wires and rods. With a Climax Wire Straightener this can be done quickly, economically, safely—by unskilled labor. A complete descriptive circular is yours for the asking.



All Federal Productive

THE FEDERAL FOUNDRY SU

Seacoal Plant
CROWN HILL, W. VA. · CHICAGO · MILWAUKEE · DETROIT · ST. LOUIS ATTA

Chamberlain Co., Los Angeles, Calif. · Pacific Graphite Works, Oakland, Calif. · LaGrand Industrial Supply Co., Portland, O ment Co

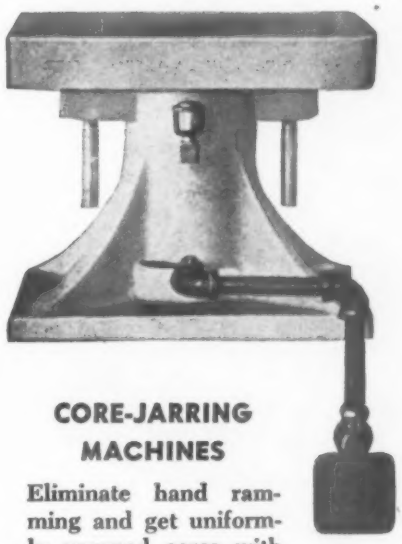
SUPPLIES

SWABS—We have eliminated the shortage of this essential item by making them ourselves. Federal swabs are made of the best flax, ample in size and won't fall apart. They're fully eighteen inches long and full-bodied. Shipped from stock — the supply is ample. Jobber inquiries are invited.

RUBBER-COVERED SHOVEL HANDLES

The best insurance you can buy against damaged patterns, core boxes or flasks. The pean-shaped grip is ideal for ramming.

They will fit your present shovels or you can order your next shovels with them already installed.



CORE-JARRING MACHINES

Eliminate hand ramming and get uniformly rammed cores with Federal Core Jarring Machines. Powered by air, these machines are sturdy and long wearing. Readily available now when you need them. The present lack of experienced labor will not handicap your shop if you have Federal Core Jarring Machines.

THE LOWE ELECTRIC SIFTER

Faster sifting, better sand conditioning combine to cut costs when a Lowe is on the job. Malleable yoke creates faster sifting; more shovel clearance permits faster loading. Enclosed ball bearing motor is a miser on current. Instantly replaceable screen bottoms. Lowe-sifted sand is better sand. The Lowe's 21-inch diameter screen bottom gives you over 10% more screening surface than the conventional 20-inch screen!

WONDER CUTTER

Users say it's worth its weight in gold. Small enough to be mounted on any bench or table, the Wonder Cutter will cut round or square rods and band iron. Priced at $39.50 f. o. b. Cleveland — every foundry should own one.

cture Sold with Service

MEMBER MANUFACTURER'S ASSOCIATION, INC. FOUNDRY EQUIPMENT

RY SUPPLY COMPANY • 4600 EAST 71st STREET CLEVELAND 5, OHIO

CHATTANOOGA, TENN. · ST. PAUL · NEW YORK · RICHMOND, VA. · Mines UPTON, WYO.

and, Ohio Cement Sales Company, Houston and Beaumont, Texas and Harvey, La. • Shanahan's Ltd., Vancouver, B. C.

CRUCIBLES *for* CARRYING

(Above) Transferring molten bronze from tilting type furnace to pouring crucible. Courtesy Bendix Aviation Company, Bendix, New Jersey.

(At right) Well-designed Crucible preheating furnace using oil fuel. Flame is directed to the inside of the Crucible, raising the temperature to 1800° F in 15 minutes. Furnace design surrounds Crucible with neutral atmosphere. Photograph courtesy North American Manufacturing Company.

Four Ways You Save

1. With Crucibles for carrying, you do away with all need of lining ladles.
2. Crucibles prevent contamination of the melt.
3. Crucibles pour clean; metal does not stick to graphite.
4. And for long service from your Crucibles, protect them from oxidation during pre-heating; that greatly increases their life.

More ways to take care of your Crucibles, more ways to assure best results, are given in "Crucible Melters' Handbook." Write for it.

Typical Crucible Furnace Installation No. 5

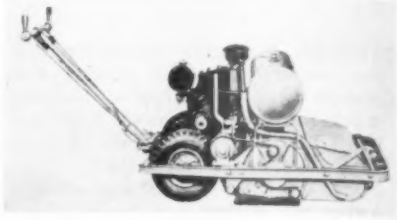
CRUCIBLE MANUFACTURERS ASSOCIATION

90 WEST STREET, NEW YORK 6, NEW YORK

(*Continued from page* 186)

ing from blurred vision by keeping sweat out of the eyes and off goggles, and can be easily sterilized for continual use.

SWEEPER: Moto - Mower Co., 4600 Woodward Avenue, Detroit 1, announces a new model motor sweeper equipped with a blower installation for cleaning out corners and margins close



to the wall. The flexible metal tubing attached blows the refuse and dirt into the path of the revolving brush. Air, applied at the nozzle, provides a more positive control that eliminates the necessity of building up high air pressures in the water tank. Greasing connections are installed on the brush bearings. Sweeper turns right or left, under its own power, by means of a separate clutch on each wheel of the tractor, controlled at the handlebar.

PORTABLE DESK: Lyon Metal Products Inc., Aurora, Ill., has designed a sturdy portable desk, adaptable for shop foremen, shipping clerks, inspectors and others and especially useful for time-study and inventory work. The

model illustrated stands on 3-in. swivel casters, has positive brake attachment, and overall size is 34½-in. wide, 30 in. deep and 53 in. high. Desk hood provides adequate space for storage of papers. Drawer is equipped with lock.

INDUSTRIAL APRONS: United States Safety Service Co., 3615 Broadway, Kansas City 6, Mo., announces a new design in neoprene aprons with snap-on chrome leather front patch designed for use where heavy abrasive

(*Continued on page* 192)

SEE — WHAT ONE MAN CAN DO with a ROURA Self-Dumping Hopper

Handles Bulk Material Quickly and Easily — Wet or Dry, Hot or Cold. Ideal for All-around Use in the Foundry.

OPERATION SO SIMPLE THAT ONE MAN MANAGES THE COMPLETE DISTRIBUTION AND UNLOADING JOB IN LESS TIME THAN SEVERAL MEN BY MANUAL METHODS

FITS ANY STANDARD-TYPE LIFT TRUCK. Ruggedly-Built

RAISE AND DUMP AT ANY LEVEL. HOPPER RETURNS AUTOMATICALLY AND LOCKS

The Roura Hopper fits any standard-type lift truck—just pick 'em up, run 'em to dumping location, pull the trip lever and the unloading job is finished and the empty hopper returns to loading position, locked and ready for the next load. They're safe and easy to handle and exceptionally well-built. *We invite you to try one on a 30-day trial basis.*

Write for NEW descriptive BULLETIN—"F"

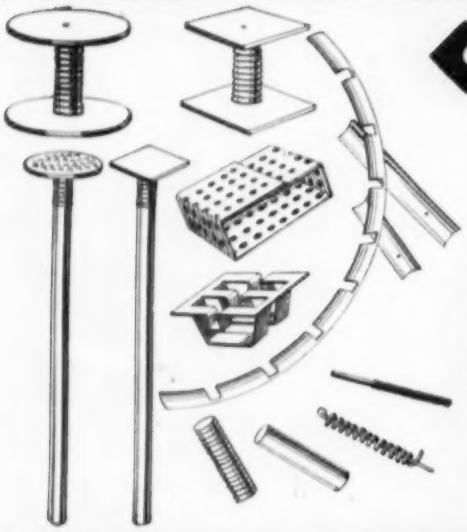
ROURA IRON WORKS

1405 WOODLAND AVE., DETROIT, MICH.

Immediate Delivery--Price $100-- 1 CU. YD. CAPACITY UNIT F.O.B. DETROIT, MICH.

Milwaukee PRODUCTS

that Improve FOUNDRY PRODUCTION



CHAPLETS AND CHILLS

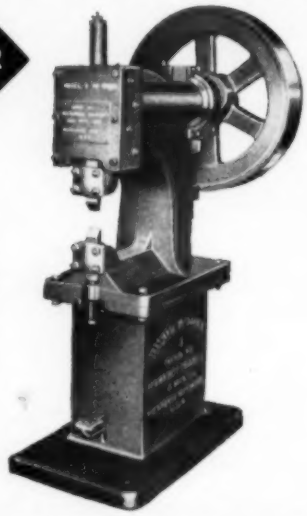
For many years Milwaukee Chaplets and Chills have played an important part in producing better castings in less time, with fewer rejects. Their design and quality is being improved constantly to help the foundryman meet the demand for finer workmanship and higher production. Ask for samples and prices of Milwaukee Thread Stem Chaplets—Standard Radius Chills—Schmitz Chaplets — Patented Adjustable Radius Chills — Shells, Tubes and other types of Chaplets and Supplies.

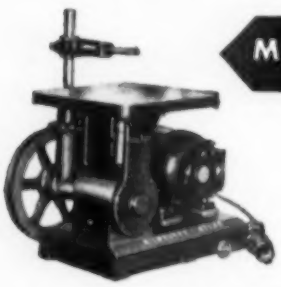
TESSMER SPRUE CUTTER

For Non-Ferrous Foundries

This simple, sturdy machine removes sprues with a single stroke. It replaces slow, tedious manual labor, with a swift, clean, effortless machine operation . . . releasing vital manpower for more important tasks. Low operating costs are assured through these advantages:

1 — Tool-Steel Cutting Knives cannot fill with Soft Metal. 2 — No auxiliary exhaust system to carry off metal particles and dust. 3 — Maintenance is limited to the occasional sharpening or rare replacement of alloy steel cutting knives. 4 — Moving parts properly lubricated, and shielded from dust and dirt. 5 — Wearing parts made of durable materials; are easily adjusted or replaced, if necessary. *Write for literature.*





MILWAUKEE ATLAS FILING MACHINE

A well designed, bench type machine of rugged construction for rapid and accurate trimming of intricate castings, and filing dies, jigs or fixtures. Eliminates many slow, costly hand filing operations.

$125.00 Complete with Motor.

Milwaukee

CHAPLET AND MANUFACTURING CO.

1025 S. 40th STREET • MILWAUKEE 4, WIS.

A 4661-2/28

(*Continued from page* 190)

action is a factor in operation using cutting oils. Tests under working operations over several months are said to show a reduction in the number of aprons used to as little as 5 per cent of former requirements.

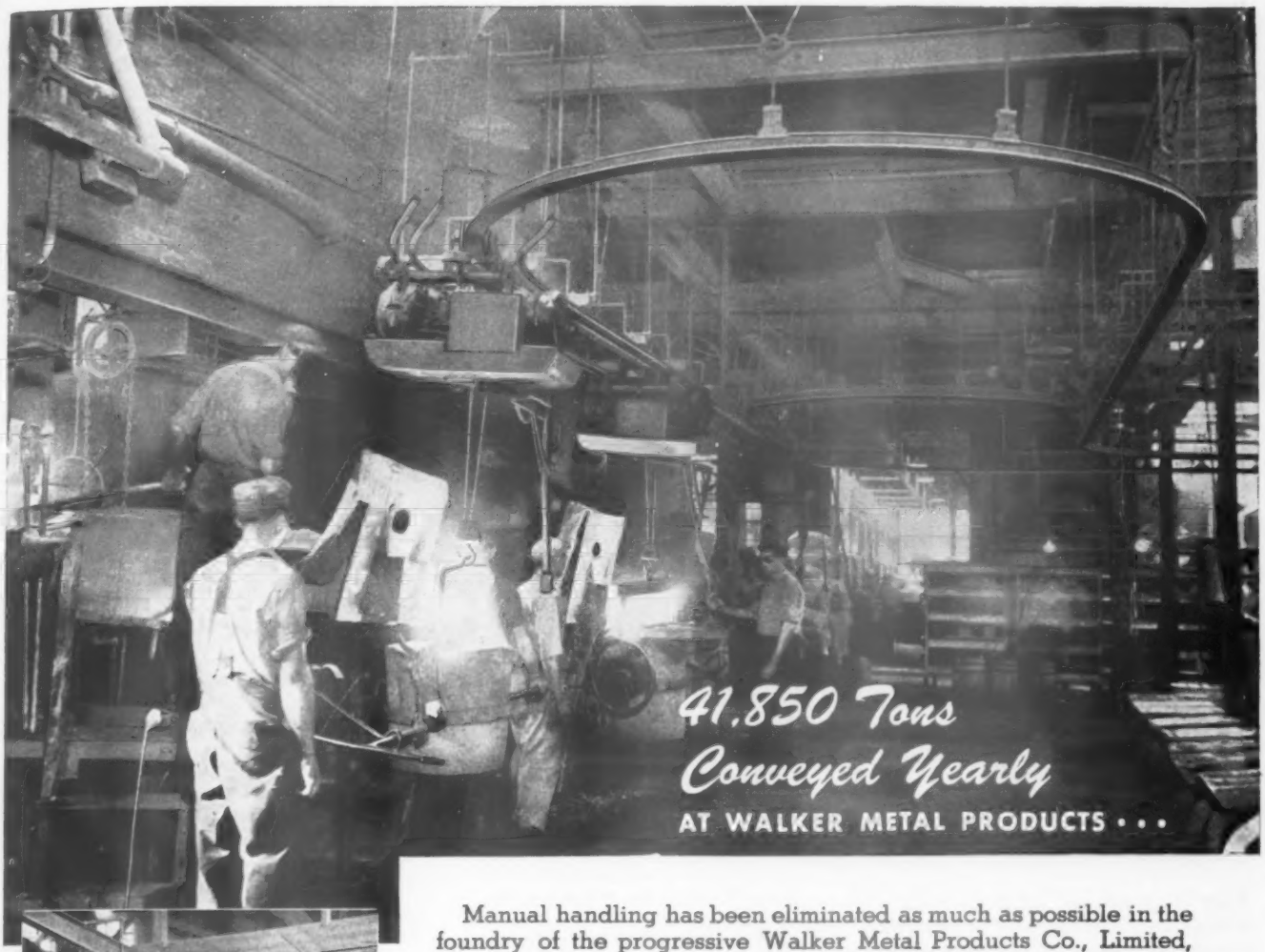
NOZZLE: American Foundry Equipment Co., Mishawaka, Ind., is marketing blast nozzles using boron-carbide inserts, jacketed in an abrasion-resistant alloy steel. The new nozzle is guaranteed for 1500 hours of service when used with steel shot or grit and for 750 hours when used with silica sand, and is said to provide improved blasting efficiency, decreased air consumption, and low hourly costs.

DUST COLLECTOR: Dust Filter Co., 160 North La Salle St., Chicago 1, has perfected a portable, self-contained dust collector in which relatively high ratio of filter surface area to air volume is maintained. Filter surfaces, as illustrated, are tubular in design, bottomless,

and dust filtered through them is collected in a pan at the bottom of the unit. The collector maintains a static air pressure of more than 4 in. at a velocity of over 5000 lfm. Made in three sizes the units weigh from 150 to 250 lb; are 36 to 48 in. high, and deliver 290, 510 and 1140 cfm. Motors are ¾ and 1½ hp. Filtered air is discharged through a large muffler to deaden air noise but with minimum resistance.

SCRAP SEPARATOR: Dings Magnetic Separator Co., 509 East Smith St., Milwaukee 7, has designed a high intensity dual cross belt electro-magnetic separator for separating ferrous and nonferrous borings, and reclaiming abrasives. Material to be separated is loaded into a hopper, from which it is distributed uniformly onto the first main belt by a reciprocating feeder. When the material passes through the first and second magnetic zones, magnetic particles are lifted by the upper magnets and pushed up by the lower ones. In this way they are held fast to the under surface of the first cross belt which carries them beyond the magnetic influence to

(*Continued on page* 194)

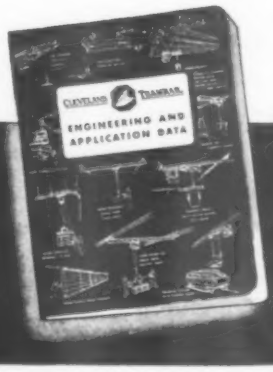


Manual handling has been eliminated as much as possible in the foundry of the progressive Walker Metal Products Co., Limited, Walkerville, Ontario, Canada. The molds are kept moving on continuous mold conveyors and all hot metal is transported over the Cleveland Tramrail overhead materials handling system.

The Tramrail System is so laid out that hot metal can be delivered to each of the mold conveyors directly from the cupolas and poured into the molds while on the move without rehandling. The molten iron is transported on one track and the empty ladles returned on another. Five one-ton hand-propelled carriers with push-button-operated hoists are operated continuously.

Much heavy lifting, pushing, lugging, common in most foundries, has been eliminated and such efficiency introduced that the motor blocks, cylinder heads and other castings are made in a fraction of the time ordinarily required.

A high rate of production has been maintained ever since the Cleveland Tramrail system was installed in 1929. Approximately 150 tons of metal are transported over the main tramrail line every 16-hour working day, or 41,850 tons per year.



GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
1155 EAST 283RD ST. WICKLIFFE, OHIO.

CLEVELAND TRAMRAIL

OVERHEAD MATERIALS HANDLING EQUIPMENT

. . . for Many Foundry Uses

MAHR SAFETY TORCHES

No. 101

Lights instantly without pre-heating.
In 5, 15, and 20 gal. tank capacities.

You'll find a Mahr Safety Vacuum Torch on the job wherever intense, direct heat is required. You can't beat it for skin drying—it handles easily, does the job thoroughly and in a hurry.

It's also used for cupola lighting, because it throws a large, steady flame into the cupola breast opening, and gives a roaring fire quickly. And for ladle heating, any bracket or rigid support will hold torch while flame is directed into ladle.

You get complete combustion in the Mahr double chamber nozzle. Requires no pressure, since torch employs the vacuum principle—eliminating hazards of pressure torches. Burns kerosene, distillate, or low grade fuel oil.

Drying Relined Ladles.

This is a convenient way to install torch for drying relined ladles, or pre-heating for pouring. Our engineers will supply you with drawings of this permanent wall-type installation. Other types also available.

Write for Bulletins on OTHER MAHR PRODUCTS

Core ovens — Mold ovens
Portable mold dryers
Sand conveyors — Vibrating screens
Annealing furnaces
Stress relief furnaces
Melting furnaces
Ladle heaters — Ladle dryers
Complete Engineering Service

MAHR
ENGINEERS • DESIGNERS • MANUFACTURERS
ALL EQUIPMENT FOR METAL HEATING

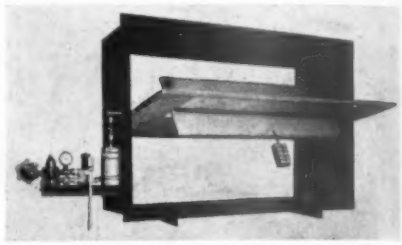
MAHR MANUFACTURING CO.
DIVISION OF DIAMOND IRON WORKS, INC.
1709 North 2nd St., Minneapolis 11, Minn.

(*Continued from page* 194)

be discharged at the side. The first main belt discharges onto the second, at which point the material is turned over and subjected to another magnetic treatment in the third and fourth magnetic zones.

CARBON REMOVER: Turco Products Inc., Los Angeles, has developed a chemical process with solvent and penetrating actions for reclaiming burner tips and welding torch fittings that have become carbonized and fouled. Parts are soaked in the liquid solution in an ordinary steel tank or container, overnight, which loosens and softens all carbon and dirt. At the completion of the soaking period the parts are rinsed clean in a vigorous air and water spray. After the treatment a brief dip in a new detarnishing liquid completely removes tarnish and renders the metal resistant to corrosion.

SMOKE CONTROL: Campbell Engineering Co., Appleton, Wis., has designed a new double damper smoke control which adjusts the smoke stack to daily weather conditions to eliminate excess smoke, reduce excess



stack temperatures, maintain uniform volume of draft, and stop combustion fuel losses. It is installed with either electric, hydraulic or pneumatic control system to meet practically all conditions where there are excess smoke and combustion losses. Savings in fuel cost ranging from 5 to 50 per cent, are claimed for its use.

ROPE LUBRICANT: American Chain & Cable Co., Bridgeport, Conn., announces a wire rope that is entirely covered with a green-colored lubricant which protects the wires, enables them to adjust themselves more easily, and develops longer rope wear. The new lubricant, which has high viscosity and good adhesion to wire surfaces, is applied under pressure to preformed rope only.

LABORATORY OVEN: Industrial Oven Engineering Co., 11621 Detroit avenue, Cleveland 2, is offering an oven designed particularly for precision experimental work in drying, baking, evaporating, polymerizing, aging and heat treating, especially where highly volatile solvents are used. Sizes of working space range from 3 x 3 x 3 to 6 x 6 x 6

(*Concluded on page* 196)

1—PARASPRAY makes better castings and cuts scrap losses by elimination of porosity. America's largest foundries casting plane engine cylinder heads consider it a necessity because porosity losses have been cut from as much as 30% or more to less than ½% by its use.

2—PARASPRAY makes smoother surfaced castings. Costly salvage welding and cleaning operations have been reduced to a minimum.

3—PARASPRAY improves the surface texture of your castings.

4—PARASPRAY is widely used for coating plaster molds to seal them against moisture absorption and improve surface smoothness. Aircraft concerns report greatly improved Kirksite castings by its use.

5—PARASPRAY film on surfaces of cores and molds decomposes into carbon black and chlorine gas. Good surfaces result and an ideal oxygen-free atmosphere is produced.

6—PARASPRAY is used to give a hard surface coating for green sand work thus eliminating much handling damage.

7—PARASPRAY applied to chills and inserts after sand blast cleaning protects them from moisture absorption and oxidation.

PARASPRAY cuts costs, improves castings and steps up production. It can help you meet your postwar competition at a profit. Ask for free test samples and information now.

Sole licensees under the Saeger Patents exclusively regulating the use of rubber compounds in making and spraying cores and molds.

PARASPRAY CORES MOLDS
PARASET CORE BINDER
PARACOAT FOR PATTERNS

FOUNDRY RUBBER COMPOUNDS CORP.

1050-30TH ST., N.W. WASHINGTON 7, D.C. REPUBLIC 2256

COPY'T 1943-FRCC

No labor...No lifting

Yet flasks are desanded quicker...safer...by smaller men

Finding men husky enough to handle flasks on squeezer and bench-molding floors is a problem no longer. You don't need those husky men.

Since Robins introduced the Floatex Shakeout equipped with the Automatic Flask Loader, anyone can handle the job. Old men, thin men, teen-age boys—all can do the shakeout work on flasks weighing as much as 300 pounds.

There is no labor, no lifting . . . the Automatic Flask Loader picks the flask from the floor and delivers it to the loading table of the Floatex Shakeout, which completely desands the flask and discharges the castings—all automatically . . . all in a matter of seconds!

In one foundry, stop-watch timing showed that nine round trips—9 flasks emptied and stacked, bottom boards removed and piled—are being completed in exactly 70 seconds! The loaded flasks weigh 150 lbs.; the men are 17 and 66 years old respectively; neither of them weighs over 135 lbs. Castings are cleaner; more sand is being removed from them and recovered for re-use.

If you are having trouble finding suitable help; if you are interested in greater production; if you would like more effective, more efficient, more economical shakeout work, ask Robins for facts about the Floatex Shakeout with the Automatic Flask Loader. When writing, please address Dept. F-7.

Robins Floatex Shakeouts are made in Portable models for loaded flasks weighing up to 17 tons; in Standard models, up to 100 tons or more—non-discharging and self-discharging types; with and without flask loaders.

ENGINEERS • MANUFACTURERS • ERECTORS

ROBINS *makes:* BELT CONVEYORS • COAL AND ORE BRIDGES • BUCKET ELEVATORS • CAR AND BARGE HAULS • CAR DUMPERS • CAR RETARDERS • CASTINGS • CHUTES • CONVEYOR IDLERS AND PULLEYS • CRUSHERS • FEEDERS • FOUNDRY SHAKEOUTS • GATES • GEARS • GRAB BUCKETS • PIVOTED BUCKET CONVEYORS • VIBRATING SCREENS • SCREEN CLOTH • SELF-UNLOADING BOAT MECHANISMS • SKIP HOISTS • STORAGE AND RECLAIMING MACHINES AND SYSTEMS • TAKEUPS • LOADING AND UNLOADING TOWERS • TRIPPERS • WEIGH LARRIES • WINCHES • WINDLASSES

FOR MATERIAL AID IN MATERIALS HANDLING . . . . . *It's* **ROBINS**

ROBINS CONVEYORS INCORPORATED
Founded in 1885 as Robins Conveying Belt Co.
PASSAIC • NEW JERSEY

MATERIALS HANDLING MACHINERY

(*Concluded from page* 194)

feet, in increments of 1 foot, with special sizes furnished to specification. Temperatures range up to 900 degrees Fahr., with a guaranteed differential of plus or minus 2 degrees. Usually furnished with electrical heating equipment, the oven may be designed to use any type of fuel, heating equipment being contained within the oven shell.

REMOTE CONTROL: M. L. Bayard & Co., 1932 Indiana Ave., Philadelphia 32, has developed a standardized system of remotely operated mechanical controls for use on cranes, winches, windlasses, steering gears, banks of furnace doors, factory windows, etc. They are suitable for power operation under speeds not exceeding 1800 rpm. Related units consist of steady shaft assembly for attachment to surfaces either square to the shaft or parallel; spiral bevel gear assemblies with interchangeable shaft ends; and universal shaft assembly made in lengths ready to be installed or with end-yoke to be field welded after the tube is cut to suitable length.

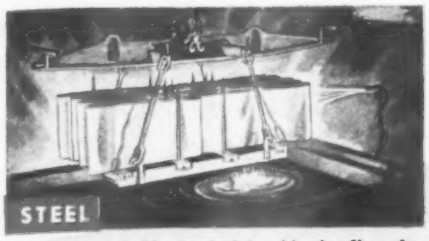
DIE GRINDER: Keller Tool Co., Grand Haven, Mich., is offering a pneumatic die grinder for continuous high speed operation, with built-in oil reservoir, air cooled cylinder, and bearings rigidly mounted in end plates for perfect alignment and accuracy. Three models are available, one equipped with collet chuck for holding mounted grinding wheels with ¼-in. diameter shanks; another equipped with adapter for holding unmounted grinding wheels with ¼-in. diameter holes; and the third equipped with ¼-in. capacity Jacobs chuck, designed for small, light drilling at high speeds.

WELDER: Harnischfeger Corp., Milwaukee 14, has introduced a square frame welder with welding service range rating of 60 to 375 amperes. The new model retains the two-part construction, single heat control, visual current calibration, and adaptability to parallel operation where higher amperage is desired, of the smaller square frame welders, with new features such as weather-proof construction, polarity reversing switch and removable stator, plus overload protection both for contacts and for the new low-voltage magnetic starter.

SAFETY CLOTHING: Milburn Co., Detroit, has developed safety clothing fabricated from cotton or duck, specially processed with plastic, which affords maximum protection against oils, acids, caustics, water, dust and fumes, with a minimum of weight. The line includes sleeves, aprons, overalls, coveralls, slacks, jackets, caps and hoods and the garments are designed to the recommended specifications of the United States Public Health Service.

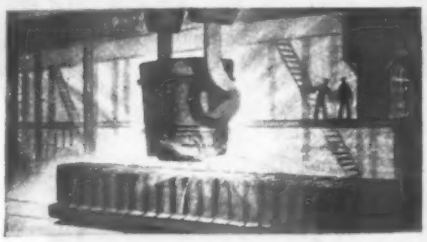
FOR DEPENDABILITY IN METAL CHEMICALS

...SPECIFY "GENERAL CHEMICAL"

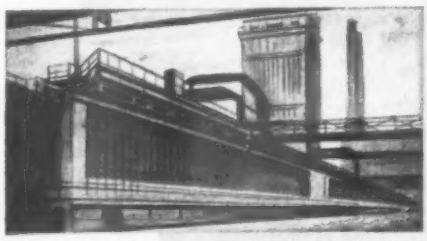


PICKLING—Sulfuric Acid—Hydrofluoric Acid—Muriatic Acid—Nitric Acid—Phosphoric Acid—Chromic Acid.

Detergents: Sodium Metasilicate—Trisodium Phosphate—Sodium Silicate—Tetrasodium Pyrophosphate.

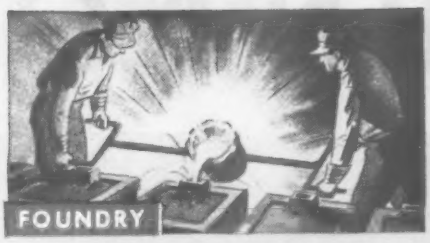


RIMMING STEEL—Sodium Fluoride for smoother-surface rimming steel.



COKE BY-PRODUCTS—Sulfuric Acid for making ammonium sulphate; for washing toluene and benzene, and for treating light oils.

Sodium Cyanide—Sodium Fluoride—Sodium Cyanate—Potassium Cyanate, for heat treating and controlling temperature.



Casting Cleaning Acid (Hydrofluoric Acid)—Sodium Silicate—Zinc Chloride—Chromic Acid • Ammonium Fluoborate—Sodium Fluoborate—Potassium Fluoborate, Anti-oxidants and inhibitors • Potassium Fluoride—Lithium Fluoride and Other Welding Fluxes • Fluoboric Acid: Solvent for silica, in cleaning surfaces.

Lead Fluoborate—Tin Fluoborate—Zinc Fluoborate—Cadmium Fluoborate—Copper Fluoborate, etc.

FOR METAL ANALYSES: BAKER & ADAMSON REAGENTS AND FINE CHEMICALS

BASIC CHEMICALS

GENERAL CHEMICAL COMPANY

FOR AMERICAN INDUSTRY

GENERAL CHEMICAL COMPANY

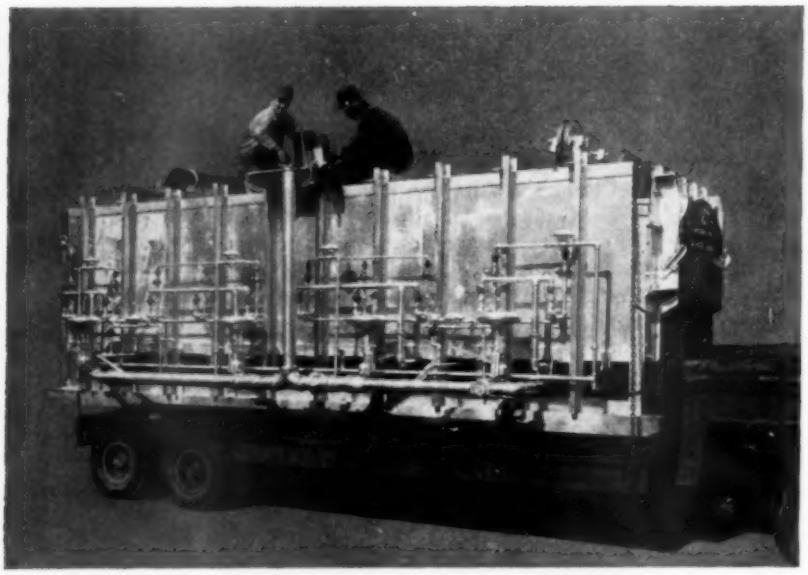
40 Rector Street • New York 6, N. Y.

Sales and Technical Service Offices: Atlanta • Baltimore • Boston • Bridgeport (Conn.) Buffalo • Charlotte (N. C.) • Chicago • Cleveland • Denver • Detroit • Houston Los Angeles • Kansas City • Minneapolis • New York • Philadelphia • Pittsburgh Providence (R. I.) • San Francisco • Seattle • St. Louis • Utica (N. Y.) • Wenatchee Yakima (Wash.)

In Wisconsin: General Chemical Wisconsin Corporation, Milwaukee, Wis.

In Canada: The Nichols Chemical Company, Limited • Montreal • Toronto • Vancouver

BELLEVUE *Controlled Atmosphere* FURNACES



In the construction of BELLEVUE "Controlled Atmosphere" FURNACES, painstaking consideration of the job to be done comes first. Every factor must be evaluated, every condition studied. Only then do Bellevue engineers attempt design and recommendation of furnace type. The soundness of that policy is being demonstrated in plant after plant. Hundreds of executives in scores of varied companies have proved, to their own satisfaction, the efficiency, speed, high production level and operating economies of BELLEVUES that were "designed" for the job. You, too, will find Bellevue experience and facilities a profitable investment for your own furnace needs.

SEND FOR FULL DETAILS

BELLEVUE
INDUSTRIAL FURNACE CO.
2975 BELLEVUE AVE. DETROIT 7, MICH.

COLLECTION AND DISPOSAL OF MAGNESIUM DUST

(*Continued from page* 90)

pipe velocity of 4500 feet per minute and a main pipe velocity of 4000 feet per minute should be used.

Air volumes for grinders, polishers and buffers should follow the A.F.A. recommendations for standard machines. The hood design, however, should follow more closely that shown in Fig. 4.

Referring to Fig. 4 the grinding wheel is shown at *A*, the hood enveloping the wheel at *B* and the spray nozzle at *C*. All corners of the hood should be made with a liberal radius to facilitate keeping the hood clean of dust particles. All joints should be made liquid-tight by butt welding and ground smooth for the same reason. No ledges should be tolerated where magnesium may lodge, and the back portion should be streamlined into the existing duct system.

In operations of this type it is especially desirable to quench the dust as near the point of production as possible. For this reason a spray nozzle *C* is located in each side of the hood directly beneath the wheel and in the path of the dust on its way to the exhaust branch. The liquid used to spray the dust may be any suitable liquid, preferably water or oil, and should be in sufficient quantity to float the solids to the settlement tank of the dust collector system.

Moist Dust Ignites Readily

Moist magnesium dust containing up to approximately 30 per cent water ignites readily and burns rapidly with almost explosive violence. When submerged in water no burning or explosion hazard exists except in case of a concentration of hydrogen gas in a closed area. The hydrogen gas is released by chemical change of the magnesium and water and must, for safety purposes, be ventilated to the outside.

One of the principal objections to the use of water to quench the dust and wash it down the duct to the collector is that a wet line will be produced for the full length of the line, thus creating a definite hazard. On the other hand, if no liquid is used dry dust will accumulate in the exhaust duct, creating a fire hazard. Since it is usually difficult to thoroughly clean out round pipes of any length the hazard increases day by day. Experience in this critical phase of the work dictates the use of a mineral oil having a viscosity sufficiently low to readily wet the dust and float it down the pipe and a flash point sufficiently high to prevent easy ignition of the oil.

Oil used in this type of system has a five-fold purpose: 1. To wet the dust, thereby raising the flash point of the dust to the flash point of the oil, about 450 degrees Fahr., which is considered ample protection. 2. To eliminate the libera-

(*Continued on page* 200)

It's here!

THE VIBROLATOR

A VIBRATOR THAT ELIMINATES CASTING DISTORTION BY . . .

Why the VIBROLATOR is better

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- **Needs No Lubrication**
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- **Economical Operation**
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The greatest bugaboo of foundry vibrators — distorted and egg-shaped castings — has finally been overcome with the new VIBROLATOR. Because its action is circular, imparting an even amount of clearance to all of the mold walls when attached to a pattern, casting distortion from this source is entirely eliminated.

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It will pay you to get complete facts on the VIBROLATOR. Better still, write your order now. The VIBROLATOR is unconditionally guaranteed to meet your every requirement! Order at once for prompt shipment and extend priority rating.

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KEWANEE, ILLINOIS

SIZES FOR ALL REQUIREMENTS

Size	Weight	Price
3/8"	5 oz.	$ 9.50
1/2"	7 oz.	11.75
5/8"	9 oz.	13.50
3/4"	12 oz.	15.00
7/8"	16 oz.	16.50
1"	24 oz.	18.00

MARTIN ENGINEERING COMPANY
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Please send me specification sheets for the Peterson VIBROLATOR.

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Metalast

THERMOCOUPLE PROTECTION TUBE FOR MOLTEN METALS

SAVE ½ YOUR THERMOCOUPLE COST

Brass and copper foundries everywhere report they are getting twice as many immersions since changing to Metalast Tubes. This means they are saving on their thermocouple cost as well, for Metalast Tubes are not connected to the thermocouple and can be replaced without damaging or discarding thermocouple.

Metalast Protection Tubes are made of a heat resisting alloy and will stand repeated immersions in molten brass, bronze, aluminum, copper and magnesium. Neither slag, molten metal nor contaminating gases can effect the accuracy of the thermocouple inside, since Metalast Tubes are drilled from special solid stock—without welds, seams or forging. Made for furnace or ladle use—in 6" and 8" lengths with standard ½" pipe thread.

For Full Details Write for BULLETIN NO. 500

ELEMATIC EQUIPMENT CORPORATION
6046-48 S. Wentworth Avenue
Chicago 21, Illinois

(*Continued from page* 198)

tion of explosive gas, since no chemical action takes place between the nonferrous metallics and the oil. 3. To eliminate the wet line along the sides of the pipe. 4. To convey the metallics through the system to the collection tank for final disposal. 5. To avoid the accumulation of wet hazardous dust and chips on the premises.

The duct system between the hood and the dust collector must be made liquid-tight, smooth throughout and provided with ample inspection and clean-out doors. The branch must be short and void of unnecessary elbows. The branches and the main must slope gradually downward toward the collector to permit drainage of the liquid into the collector, or a separate tank must be provided into which the liquid may drain as illustrated in Fig. 1.

In the system shown in Fig. 1 the air duct carries the air and liquid toward the collector as far as the point *A* directly over the settling tank. Here the liquid flows into the settling tank and the air flows into the collector. The air is drawn through the system and collector by the exhaust fan located on the far or clean air side of the collector, and the discharge from the fan is carried outside of the building.

Spray Nozzles Served by Pump

The liquid must be circulated by a pump to each wheel hood and to the collector. For this purpose a pump is located adjacent to the settling tank, taking its suction from the tank and discharging through a pipe system to the spray nozzles located at each side of the grinding wheel hood. At the point *B* in the liquid piping a branch is taken off leading to the liquid connection of the dust collector. Liquid passing through the nozzles at the wheel flows down the duct to the settling tank, and liquid passing through the collector flows down through the collector, further washing the air therein, and passes back to the settling tank through the drain pipe attached to the bottom of the collector.

The collector is void of any moving parts so that the possibility of a spark to ignite the collected material does not exist. The collector is designed to avoid ledges, protruding bolts or rough places where material might lodge. Every bit of surface is subject to the washing action of the liquid and therefore is kept clean. The material washed out of the air stream is carried through the drain pipe at the bottom of the collector to the settling tank. Any entrained moisture in the air is removed by an effective entrainment separately located in the top of the collector ahead of the fan. Only clean, moisture-free air passes through the fan, so that the fan may be a regular or standard design exhaust fan.

The settling tank may be an ordinary rectangular type tank, a tank equipped with an automatic ejector type conveyor for removing the precipitated solids continually or any desired type of tank.

(*Concluded on page* 202)

Upping Production and Morale

Overhead return of sand, conditioned mechanically to a constant predetermined temper, relieves the molders of tedious lifting, bending, shoveling,— and reduces your own headaches, too. Individually engineered to your particular and individual requirements, Bartlett-Snow sand, mold and castings handling equipment will give you a maximum of both quantity and quality from your plant. Costs go down. Your product finds readier sale. The workmen get larger take home pay—easier—like their jobs better. Absenteeism and turnover are much reduced. And the smoother, more even, more continuous production means bigger profits, larger dividends for you. Can we send you more details?

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ENGINEERING REPRESENTATIVES IN THE PRINCIPAL CITIES

FOUNDRY SAND, MOLD AND CASTINGS HANDLING

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means precision in
METALLURGICAL TESTING EQUIPMENT

"Buehler equipment is made finer than might be considered absolutely necessary for laboratory work, but it certainly is a pleasure to use it." This remark made by a well known metallurgist is typical of the opinion throughout the field where Buehler testing equipment is used. If you use Buehler equipment you have the best.

STANDARD POLISHER NO. 1500

Accurately polished specimens can be produced with speed and ease with Buehler polishers. The sturdy construction and vibrationless operation help to prevent pitting and amorphous film. The 8" polishing disc is attached to a tapered arbor on the motor shaft by means of a stout sleeve. This construction feature reduces peripheral vibration to a minimum. The standard polisher is a complete unit with a direct mounted ¼ h.p. radial thrust ball bearing motor. 115V., 60 cycle, AC, single phase, with selective speeds 575 and 1150 r.p.m. controlled by a mounted switch with handy lever.

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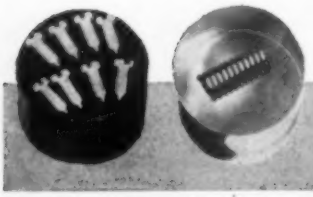


Buehler Ltd.
A PARTNERSHIP
METALLURGICAL APPARATUS
165 West Wacker Drive, Chicago 1, Illinois

(*Concluded from page 200*)

The solids precipitate slowly but surely, and in the system described should some small portion of solids pass back through the liquid lines no harm would result since there is no place where such carryback could cause trouble by clogging. The settling tank, if other than the continuous ejector type, must be cleaned periodically as experience may indicate, preferably after each shift or daily as required by the N.F.P.A. code.

Other operations on magnesium parts, such as filing, sawing, chipping and machining, may be handled in a manner very similar to that of grinding, the difference being mainly in the hood design.

Coolant for cutting operations should be directed on the contact point between tool and work to carry away the heat and free dust or chips. Obviously such coolant should not be water or water soluble oil. A mineral oil having a low viscosity to readily wet the magnesium particles, and a flash point sufficiently high to prevent easy ignition, should be used.

Workmen should be schooled to keep clothing and arms free of magnesium dust. Clothes should be plainly made, without pockets or heavy seams. The fit to the body should be tight rather than loose to avoid wrinkles in the cloth where dust may lodge. An all-enveloping, smooth-texture apron should be worn, and where dust is especially prevalent the worker should remove himself at definite intervals to a room provided and equipped for the purpose of cleaning all loose particles and dust from his person.

Dispose of Dust

So far no suitable means for reclaiming magnesium dust has been devised. The general practice is to remove the collected material daily, in accordance with the N.F.P.A., and either bury the accumulation after mixing with sand or burning under competent supervision.

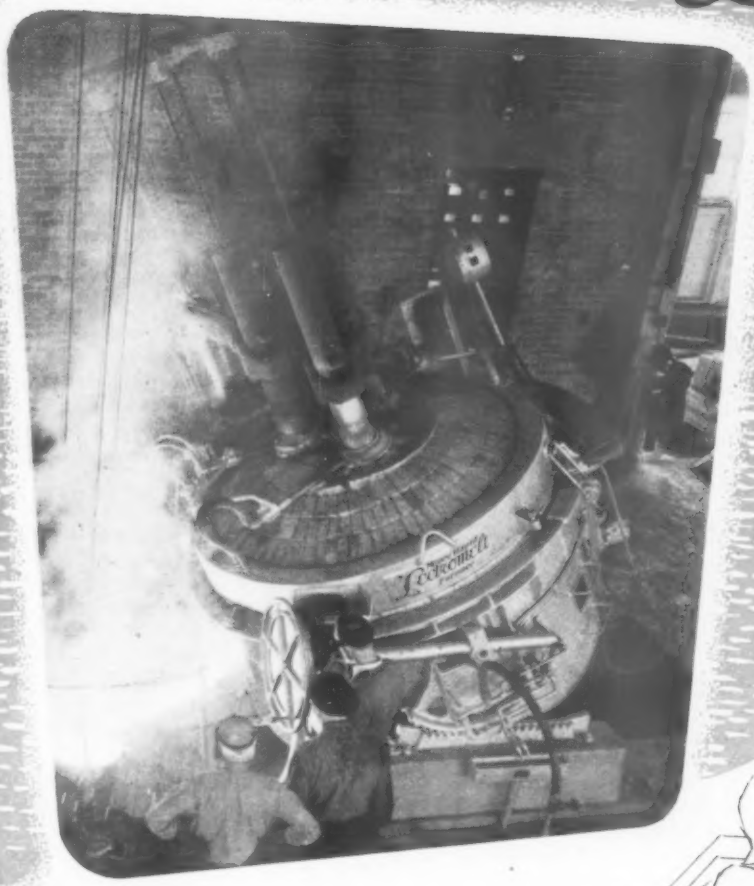
Up to this point nothing has been said regarding the merits of various liquids used for operation of the wet type collectors on magnesium dust. It is obvious to the reader that the equipment shown and described above may be used in any of a number of forms. It may be used as a central system to handle any number of dust points of any description or it may be used as an individual system serving a single grinding wheel or other dust point. It is also obvious that any liquid may be used in the system.

During recent years some plant officials demanded a collector in which oil of a reasonably high flash point could be recirculated. The object of this request was to eliminate the fire hazard connected with water-soaked magnesium which had caused many disastrous fires and many bad burns, some of which proved fatal to workmen on grinding operations. Tests showed that by a simple change in fan speed to account for the difference in specific gravity of the oil used as compared with water, collectors of the wet type operated satisfactorily.

MOORE RAPID

Lectromelt

FURNACES



base your plans on Lectromelt top-charge furnaces

Definitely, the Moore Rapid Lectromelt Furnace of the Top-Charge Type has demonstrated the following four points so vital to plant operation in the melting of steel and iron:

- Improved Quality
- Increased Production
- Lower Operating Costs
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The consistent record of more than eight hundred Lectromelt Furnaces in use throughout the world is an assurance of efficient, economical performance.

These advantages are the result of thorough, time-tested engineering, and of careful, year-after-year study of Lectromelts in operation. Simplified mechanisms and sturdy construction make for uninterrupted service and long life.

Lectromelts therefore merit your most careful attention when planning plant additions or replacements. Catalog mailed on request.

PITTSBURGH LECTROMELT FURNACE CORPORATION
Pittsburgh 30, Pennsylvania

The adventures of BILL

BY PAT DWYER
Drawings By RICHEY

"ISN'T it a wonderful thing," I said to Bill as we sat on the veranda in the langorous gloom of a perfect summer night, "that we should be sitting here warm and comfortable, while a scant five or six months ago we were creeping around and through one snow bank after another like so many Esquimaux, or these hardy lads who followed Byrd and Peary and Shackleton in their search for the north and south poles. Fairly used to make me shiver when I read of the cold and misery and the incredible hardships they endured."

"Seems to me," said Bill, "that you also might do a bit of sympathetic shivering during the past three winters for the thousands of boys who suffered the tortures of freezing in the Aleutians and in European battlefields. Maybe I am somewhat of a pagan for harboring such vindictive thoughts, but I am free to admit that I derive a great deal of pleasure from the hope that in the hereafter there is a particularly warm spot—and I mean warm—for those who are responsible for the unnecessary suffering and death of millions of innocent people."

"Well," I admitted, "if a poll was taken I imagine you would find an overwhelming majority sharing your highly commendable and pious—ah—shall we say—slant on this particular subject. In fact I might go a step farther and say that a goodly portion of this majority would favor an application of the hot pot now instead of waiting for an indefinite future and a problematical location where late comers could see or hear nothing.

"Every country in the world, every race of people, civilized or savage or in between, recognizes the fact that occasionally a member of the group, a native son is not fully endowed mentally. The balance wheel appears to be missing—"

"Why do you keep pussy footing all around the mulberry bush? Say the guy is nuts and let it go at that."

"Nuts?"

"Sure, nuts. Meaning batty, potty, dippy, bats in the belfry, crazy, delusions of grandeur, blind spots and so forth and et cetera. Know what I mean?"

"Certainly I know what you mean even if you have to dredge up a collection of terms at which I fear some of our most distinguished educators would look askance. I am just wondering if you know what I mean when I referred to these mentally unbalanced unfortunates. In primitive communities they are ignored or treated with sympathy so long as they are harmless. The minute they become dangerous, or show any signs of homicidal mania, the official tribal cutter-offer, swings the long sword or the axe and neatly separates the head from the body to the applause and satisfaction of one and all.

"In our so called civilized communities the mentally affected are confined in establishments maintained at the public expense. Duly qualified authorities examine each case, and if these authorities decide that the victim has to go in, why in he goes. Tis a sensible arrangement and complies with the program of public safety, particularly where the afflicted person is a menace to the lives and properties of other people in his vicinity."

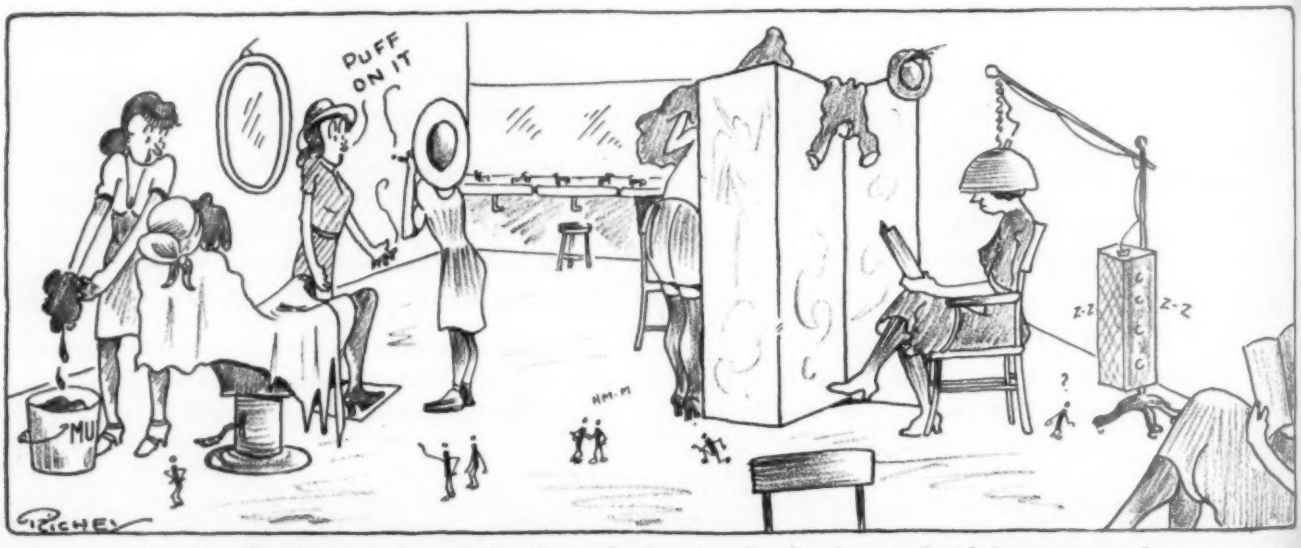
"You are right on the beam, so far my lad. So what? I'll tell you so what. Like many other rules and laws and regulations, the system works all right until it touches Holy Willie, the Main Guy in the High Chair. When in his supreme egotism and blindness he proposes a plan that every sensible person knows inevitably will result in ruin and desolation, these same people let him go ahead instead of putting him away in a nice padded cell where he could scream to his heart's content.

"As my old aunt Maria used to say, 'People are quare.' After thousands of years of wars I suppose it is too much to hope that wars will cease by the simple device of catching the human spark plug and throwing him into the jug, or better still taking him far out to sea and throwing him overboard with a set of old grate bars neatly attached to each leg to insure a straight and perpendicular dive to the bottom."

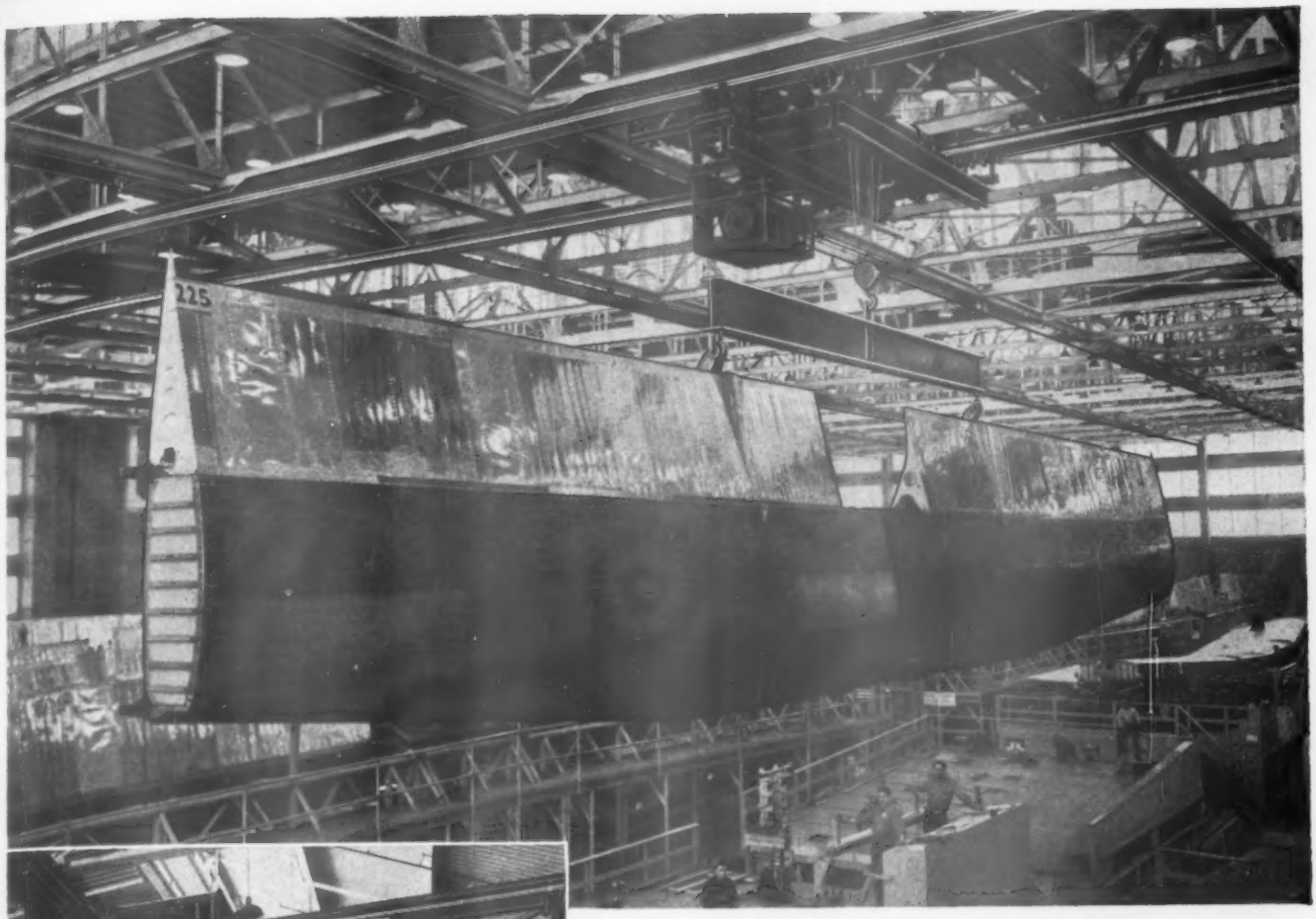
"Your idea," I said, "has considerable merit, but in any attempt to apply it, I am afraid you would find yourself in the position of the little mouse who suggested that it would be a good idea to hang a bell on the cat's neck. As the brave little fellow claimed, that would prevent the perpetual enemy from sneaking up and pouncing on a victim. The idea was applauded vigorously until a second mouse presented the $64 question 'Who is going to fasten the bell on the neck of the bally old'—well, presumably the mice had a word for it among themselves."

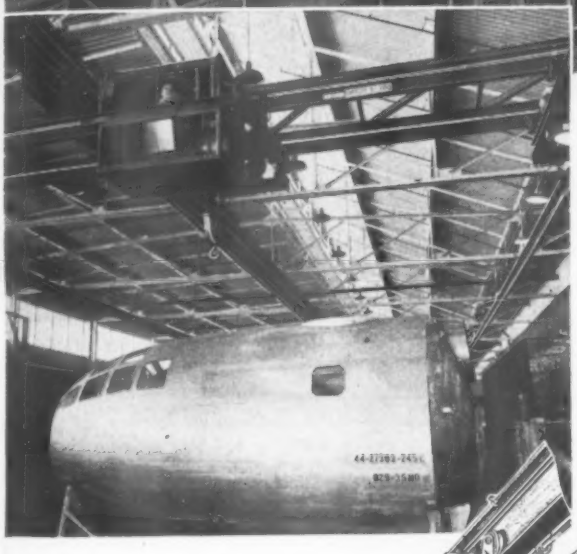
"The mice," Bill remarked, "probably

(*Continued on page* 206)



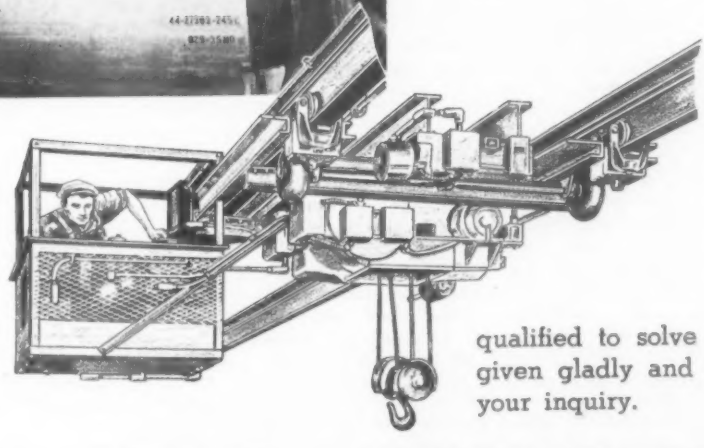
Beauty parlors from coast to coast flourish on a bucket of mud and pathetic faith of believers in miracles





Top
Long-span cranes operate over multiple crane rails and run the entire length of the building.

Bottom
Two short-span cranes inter-locked as a single unit. Carrier can operate each crane individually or both as a single unit.



AMERICAN MONORAIL CRANE

Handles large center section of B-29 Wing

The above photograph shows a six ton center wing section of a B-29 being lifted 25 feet in the air and covering a distance of 85 yards — completely handled by crane cab operator.

This is another example of the overall application of American MonoRail cranes. This long span crane in many respects resembles an overhead railway system, all movement being controlled by the operator in the cab.

Regardless of the weight and type of overhead handling needed, American MonoRail Engineers are qualified to solve your problems. Their services are given gladly and without obligation. We invite your inquiry.

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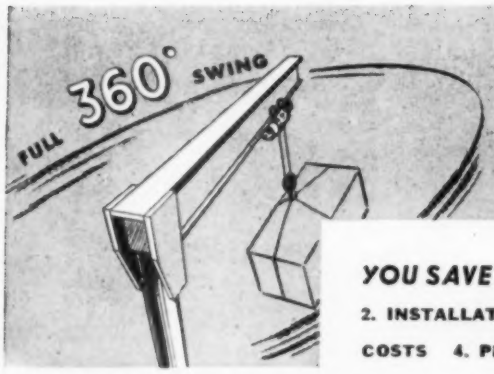


CHICAGO TRAMRAIL

JIB CRANES

SPEED

POINT-OF-OPERATION JOBS

YOU SAVE . . . 1. MANPOWER 2. INSTALLATION COSTS 3. COMPENSATION COSTS 4. PRODUCTION COSTS 5. MAN-HOURS

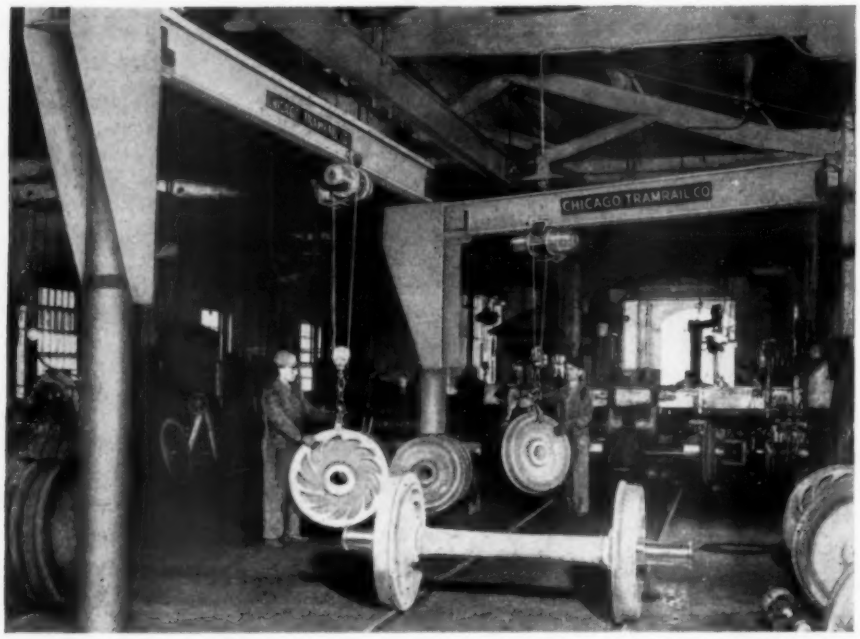
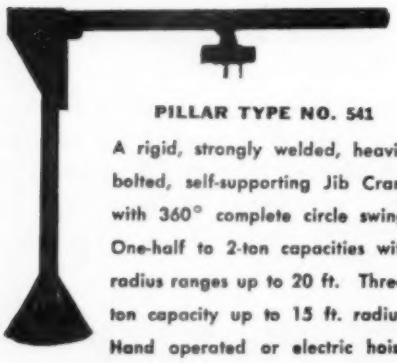


Photo courtesy of Union Pacific Railroad

The assembly of railroad wheel-and-axle units is a job that calls for precise coordination in heavy handling. Too light a job for costly overhead cranes, and too dangerous for all but the most skilled manual labor, it is an ideal application for fast-action, flexible Jib Cranes. Working in conjunction, the two nimble Jib Cranes ease the wheels into place on the axle swiftly and surely, without danger to the delicate bearing surfaces of the axle or journal. This used to be a job for skilled workmen, but now easy-to-operate Jib Cranes take over the difficult task—a real help in these labor-scarce times.

Jib Cranes help to reduce compensation costs because they lessen the probability of accidents that are so frequent in heavy handling. For example; the operation above was formerly a dangerous one. Many strains and broken bones resulted from rolling the heavy wheels into position, but now the men have only to guide the free-swinging Jib Cranes as they swing around, pick up the wheel and carry it to the point of assembly.



PILLAR TYPE NO. 541

A rigid, strongly welded, heavily bolted, self-supporting Jib Crane with 360° complete circle swing. One-half to 2-ton capacities with radius ranges up to 20 ft. Three-ton capacity up to 15 ft. radius. Hand operated or electric hoist.

IN *YOUR* PLANT

It's easy to see how swiftly, economically and safely Jib Cranes perform the operation illustrated. You can effect these same savings in your plant through the use of Jib Cranes. Look around your plant—you're sure to see many places where the use of these sturdy "mechanical muscles" will save you time and money as well as speed up production. Write for full particulars today. We will be glad to send you an illustrated circular showing the various types of Chicago Tramrail Jib Cranes together with many suggested applications for their use.

WRITE TODAY!

CHICAGO TRAMRAIL COMPANY

2910 CARROLL AVE. Phone KEDzie 7475 CHICAGO, ILL.

(*Continued from page 204*)

had a word for it. They are pretty clever little lads—and that certainly is an understatement for the famous Mickey—but I had some correspondence recently occasioned by the misuse of certain terms. Want to hear about it?"

"No," I said, "I do not want to hear about it. Probably from one of your old time friends of the open road. Written with a pencil on a narrow sheet of ruled paper and with the same word spelled in half a dozen ways and every one wrong. Nuts to you and your correspondence."

"Boy!" said Bill, admiringly, "you pick up the words right quick. I also hasten to congratulate you on the nice and discriminating taste you display in requesting, nay, absolutely insisting, that I go to town on this job in a few well chosen words. I shall be glad to pause at appropriate intervals for your comment and—er—well merited applause."

Clearly a job for famous Mickey

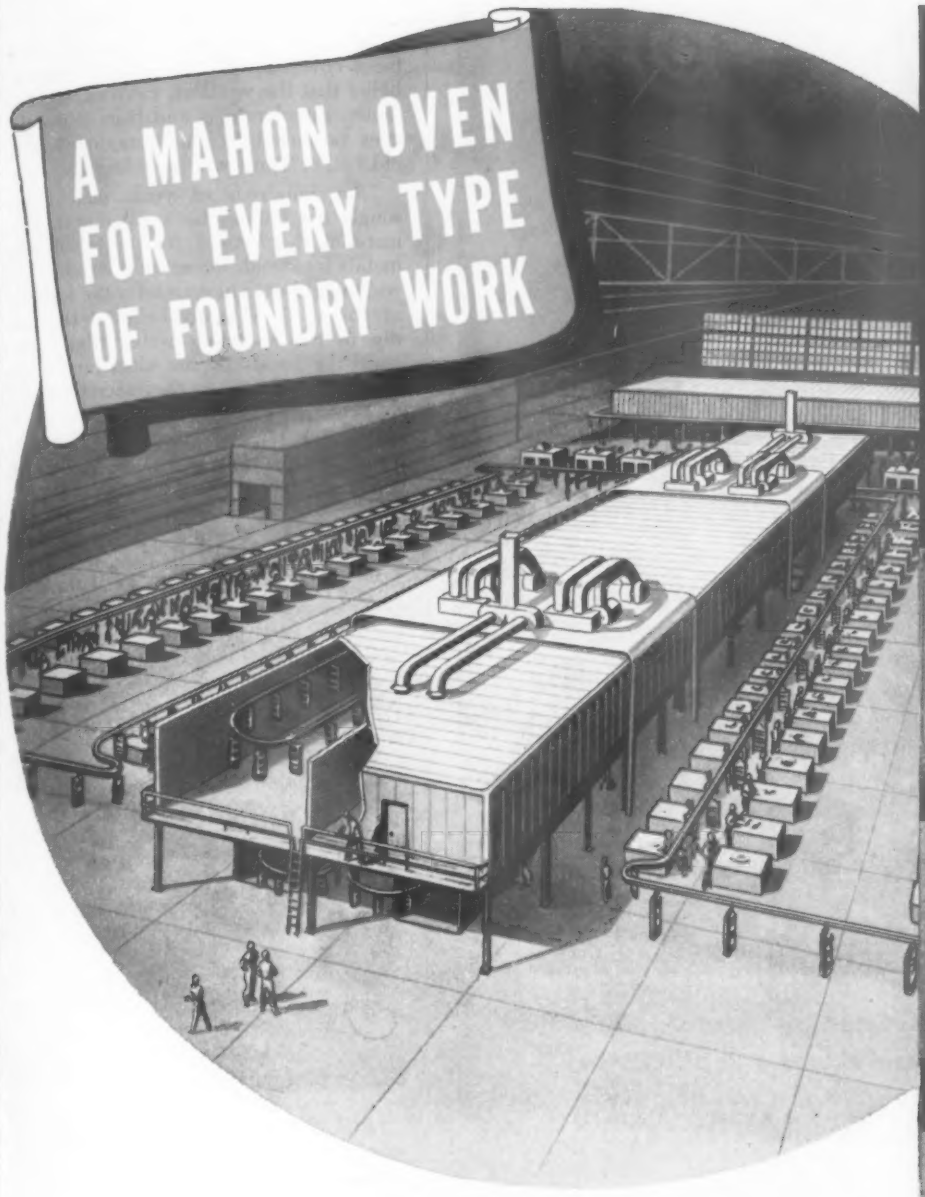
Deep and dignified silence on the part of the party of the second part.

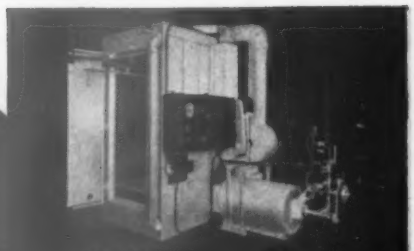
"The letter," Bill continued, "came from a research establishment with a title as long as your arm. The writer apparently groping around in the twilight gloom of a dark and impenetrable research jungle wrote as follows: 'We have been requested to furnish whatever information we have on the subject of mud guns, what they are, where and when are they used and the names and addresses of the maker or makers. It is our understanding that the device is used for stopping the tap hole in furnaces and also for applying repair material to the lining walls of open hearth and other types of furnaces. We shall appreciate your kindness in checking on these features so that the information we transmit to our client shall be accurate and authentic.'

"My first and natural impulse was—as our theatrical friends say—to go along with the gag and point out that the writer had omitted two other important uses for the mud gun. One is in beauty parlors

(*Continued on page 208*)

A MAHON OVEN FOR EVERY TYPE OF FOUNDRY WORK



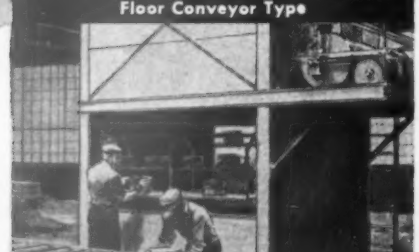


Box Type with Swing Doors

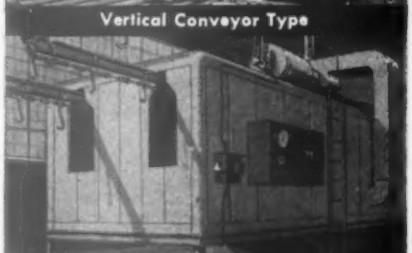
Box Type with Power Lift Doors

Multiple Rack Manual Type

Floor Conveyor Type



Vertical Conveyor Type



Overhead Conveyor Type

Mahon Core Baking Ovens and Mahon Mould Drying Ovens are designed and built to specific requirements. There is a type for every possible purpose—manually-operated—or conveyor equipped for automatic streamlined production. Mahon Ovens incorporate many important improvements in oven construction—in safety devices—in controls—and in types of heating equipment. They can be provided in any size—any shape—any temperature rating to exactly fit individual demands. Gas or oil fired—electric or steam heated.

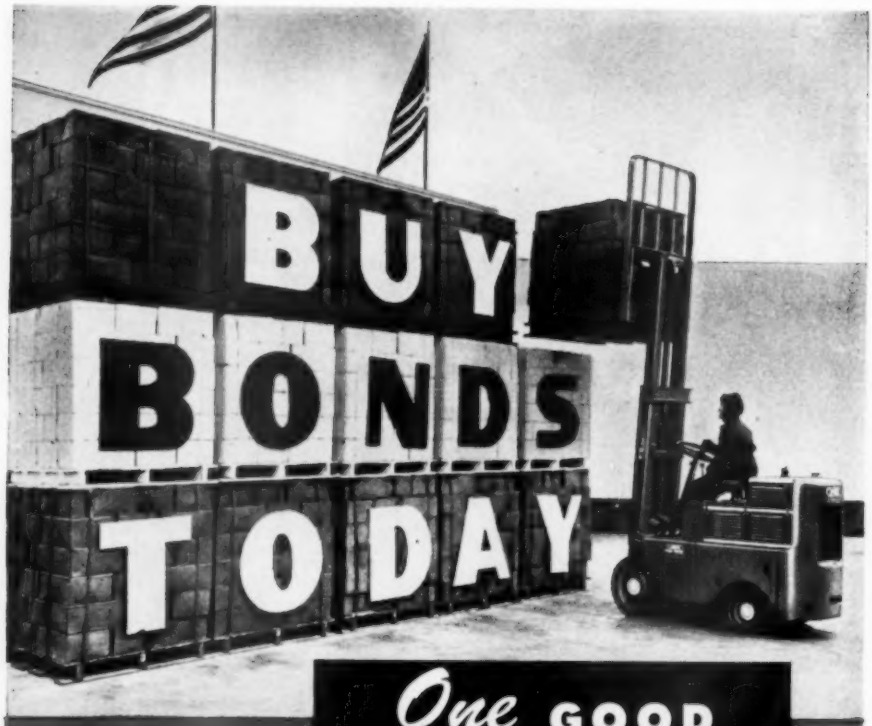
To bring your core and mould making operations to the peak of efficient performance, call in Mahon engineers. You can be sure their recommendations will be practical and workable—and that the equipment you purchase will prove a worthwhile and lasting investment.

Address inquiries to INDUSTRIAL EQUIPMENT DIVISION

THE R. C. MAHON COMPANY

DETROIT 11 — CHICAGO 4

Manufacturers of Metal Cleaning Machines • Rust Proofing Machines • Hydro-Filter Spray Booths • Ovens of All Types • Filtered Air Supply Units • Hydro-Foam Dust Collectors—and Many Other Units of Special Production Equipment—including Complete Finishing Systems



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Cited for extraordinary usefulness and efficiency beyond the call of duty—the flexible, tireless

Pallet and CLARK fork truck

the extraordinary pair that speeds the flow of munitions, food and supplies to the point of use.

To see the wide range of usefulness of Clark Tructractors and Fork Trucks, send for handy 72-page pocket catalog—describes 60 husky, well engineered vehicles, gas and electric powered.

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BATTLE CREEK, MICHIGAN, U.S.A.

Products of CLARK • TRANSMISSIONS • ELECTRIC STEEL CASTINGS
AXLES FOR TRUCKS AND BUSES • AXLE HOUSINGS • BLIND RIVETS
INDUSTRIAL TRUCKS AND TRACTORS • HIGH-SPEED DRILLS AND REAMERS
METAL SPOKE WHEELS • GEARS AND FORGINGS • RAILWAY TRUCKS

(*Continued from page* 206)

where poor, deluded victims have their faces covered with mud in the pathetic belief that the wrinkles, canyons, crevices moles, discolorations and bags under the eyes produced by the tramping feet of old Father Time, will be obliterated.

"For hundreds of years men vainly sought the Philosopher's Stone, a magical material that would transmute all base metals into gold. Other lads searched the wide world over in search for the fountain of youth. They firmly believed that one dip in the sparkling water would turn back the hands of the clock and make them as good, or—as they secretly hoped—better than they were in the days of their swashbuckling, rollicking, vigorous and lusty youth. Long since, men have given up any hope or belief in the philosopher's stone or the fountain of youth, but the ladies' steadfast faith and courage never have faltered. Their shrine of secret devotion is a mirror and they still believe that restoration of youth and beauty can be achieved artificially. Their philosophy of life may be summed up as: What does it profit a woman to gain the whole world if she has a puss like a hunk of coke or like that of the wicked queen in the third act of Snow White and the Seven Dwarfs. Come to think of it the little fellows were not refugees from a beauty show."

"Come, come, my good man. Enough of this idle persiflage. You said you were tempted to suggest a second use for the mud gun. I trust it is more appropriate, more to the point than the one you have just given."

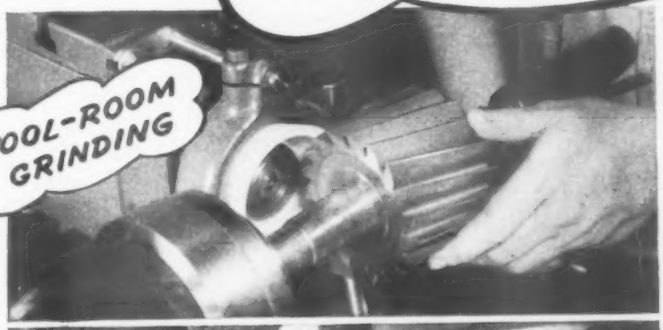
"Well," said Bill, "I'll tell you. The answer is yes and no. If my correspondent was an ordinary citizen I might get by with a bit of kidding. If he was a sad and solemn bird molting among his test tubes, retorts and bunsen burners or a pompous stuffed shirt dozing in the front office, he might feel offended. As my old uncle Malachi used to say 'Lave sleepin' dogs lie, me b'y. Then ye won't have to buy a new pair of britches, or have the old family doc put a few feather stitches in yer leg.' I ditched the second suggestion I had in mind to the effect that mud guns were the instruments used in political campaigns for smearing the opposition candidates.

"In a nice civil letter I pointed out that my correspondent was right in his assumption that a mud gun was used for stopping the tap hole in a blast furnace, but that he was entirely mistaken in the assumption that the same type of gun was employed for spraying material on the interior wall of an open hearth or any other type of furnace. The mud gun is suspended from an arm attached to a furnace column, or to an independent pedestal. The device can be swung in a wide arc horizontally depending on whether it is in or out of service. The device includes a hopper loaded with clay, a motor and two screws which force the clay through a tube and into the tap hole to stop the stream of metal. I referred him to two prominent manufacturers for further information.

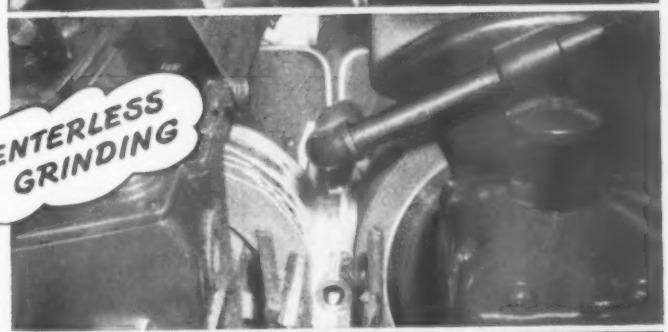
(*Continued on page* 210)

THERE IS A PRODUCT BY "CARBORUNDUM" FOR EVERY ABRASIVE APPLICATION!

TOOL-ROOM GRINDING

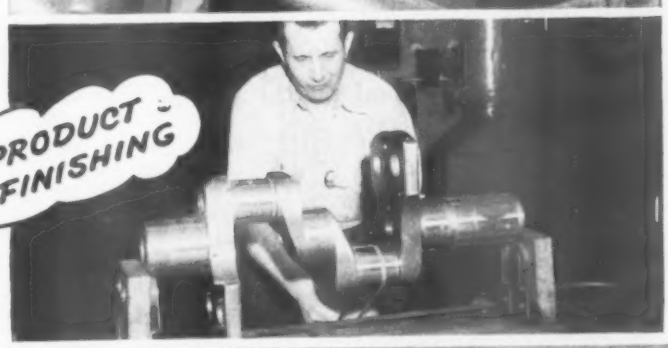


CENTERLESS GRINDING



CENTER-TYPE GRINDING

PRODUCT FINISHING



YEARS of skilled research and experience by "CARBORUNDUM" Abrasive Engineers have led to the finest, most complete line of abrasive products on the market — abrasives that give you the maximum in efficient production at the lowest possible cost. Consult our nearest office to obtain the right abrasive product by "CARBORUNDUM" to meet your particular requirements.

The Carborundum Company,
Niagara Falls, New York.

THERE IS A PRODUCT BY

CARBORUNDUM

TRADE MARK

FOR EVERY ABRASIVE APPLICATION

("CARBORUNDUM" is a registered trade mark of and indicates manufacture by The Carborundum Company)

CUSTOM-BUILT

Shop Containers

"they do so much for so little"

● Of course, if one of our many stock sizes or styles will serve—all the better. But rather than compromise, since the efficient daily flow of small products through your plant is involved, most manufacturers find specially designed containers a positive economy, the extra cost in most cases being trifling. The trend, therefore, for many years has been so strongly towards equipment individually engineered for maximum utility, that our built-to-order business has grown to large proportions.

Design Service. Avail yourself of our design service. Drawings, specifications, catalog and prices gladly submitted, without obligation or cost to you.

SHOP EQUIPMENT DIVISION

Cleveland Wire Spring Company

5250 BROOKPARK ROAD
CLEVELAND 9, OHIO

Cleveland
STEEL SHOP EQUIPMENT
STOCK STYLES FOR GENERAL UTILITY
BUILT-TO-ORDER to meet special requirements

(*Continued from page* 208)

"The other gun was developed by the manufacturer of a refractory lining material in powdered form. The material is siphoned by a water jet and discharged through a nozzle inserted through the furnace door."

"The whole thing," I said, "sounds kind of fantastic to me. Knowledge of these guns, their construction and method of operation is familiar to a comparatively large number of people directly connected with blast furnaces and open hearth furnaces. Many other people not directly interested have seen references and illustrations in the editorial and advertising sections of technical publications. It seems incredible to me that even the most modest research bureau should seek information on such an elementary subject."

"My dear young fella, you ain't seen nothing yet. Just take a gander at this grateful letter of acknowledgment: 'We wish to take this opportunity of thanking you for your very informative letter of recent date. The information submitted has proved very helpful and we are exceedingly grateful for the co-operation you have extended. If we can reciprocate at some future date, please feel free to call on us. With our kindest regards we remain sincerely yours.' "

"And what pray, is wrong with that?"

"What's wrong with it? He says. If you were not in such a hurry, and if you were to dip your little weasel eyes in a bath now and again, you would see that the letter is addressed to *MISS* William Oldtimer instead of Mr. or William or even Bill."

"Dirty work at the crossroads. Looks to me like a shot from a mud gun. Have you taken the proper and necessary steps to prevent this canard from coming to the public eye?"

Bill rested one elbow on the chair arm and gestured easily and eloquently by bringing his hand from a vertical to a horizontal position. "Listen," he said. "Between me and little Dolly Varden out in the front office we knocked off the following dignified rebuke:

" 'My dear L.M.: At one time or another in a long and I trust not wholly misspent life, I have been addressed in terms that ranged from the first innocent prattle of my children, to the arrogant, contemptuous, profane and sarcastic remarks of an ignorant, rough and tough, old time bully foundry boss; from the shy and blushing whispers of affection from my first sweetheart to the 'Hey' and 'Say, you' and 'Are you listening to what I am saying' of close relatives, stray acquaintances, cuppa coffee birds and miscellaneous bits of flotsam and jetsam along life's pathway. I have had letters addressed to me as Mr., Mister, Squire, Boss, Baas, M'sieu and Senor with a cute little twisted accent over the *n*. BUT, up to the present I never have been addressed as Miss. Of course 'tisn't a matter of life and death, but I confess I am curious to learn what feature in my recent letter on the subject of mud guns led you to the conclusion that I am a Miss. Is it possible that the -ah-

(*Concluded on page* 212)

Memo to Mr. Post-War Planner:

No further away than your telephone is an experienced engineer who has helped other executives, and can help you solve your industrial heating problems. That's part of the service your Gas company maintains so that manufacturers, now faced with reconversion of their plants, can learn all the advantages of Gas for their specific needs.

Gas is doing a great war job for industry, has helped speed production, has proved most flexible and adaptable in many new applications. More and more industrialists have come to know and appreciate the superior values of Gas and have come to rely on their local Industrial Gas Engineers for considerable help on industrial heating problems.

Whatever your industrial heating operation may be, look into Gas first. Gas is a precision fuel, it is fully automatic in operation, it heats quickly, and is especially useful in complex operations. And Gas is economical. It will pay you well to study it for peacetime production.

BUY WAR BONDS—HELP SPEED VICTORY!

AMERICAN GAS ASSOCIATION
INDUSTRIAL AND COMMERCIAL GAS SECTION
420 LEXINGTON AVENUE, NEW YORK 17, N. Y.

THE TREND IS TO GAS
FOR ALL INDUSTRIAL HEATING

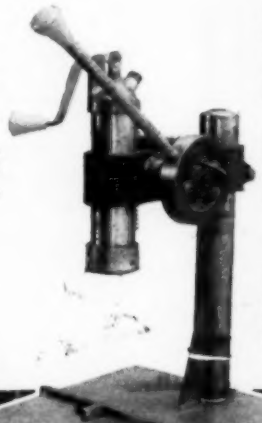
NEW and UNIQUE! » THE CARTRIDGE BENCH CORE BLOWER

USERS REPORT REMARKABLE INCREASES IN QUALITY AND QUANTITY OF PRODUCTION

PRODUCES WIDE VARIETY OF SMALL INTRICATE CORES WITH UNUSUAL SPEED AND SIMPLICITY.

COMES READY TO USE —VIRTUALLY NO INSTALLATION COST.

CAN BE OPERATED WITH UNSKILLED LABOR—EXTREMELY EASY TO USE.



IF YOU MAKE CORES 2 LBS. OR UNDER — THIS UNIT IDEALLY SUITED TO YOUR USE.

DESIGNED BY TWO PRACTICAL FOUNDRYMEN.

WRITE FOR COMPLETE DETAILS AND NEW BOOKLET

Core boxes can be made very light, in most instances bench equipment now used can be converted for blowing. Almost any sand now commonly used on the core bench may be used for blowing cores. Adjustment for boxes of different height, size and shape may be made instantly.

To operate, core box and cartridge are held down by pressure handle while left hand operates blow valve. After core has been blown, the box is pulled forward and cartridge is lifted off and the work of drawing core is completed on base of machine.

FILLS NEED FOR SIMPLE, FLEXIBLE BLOWER

The New *Redford Cartridge Bench Blower* has met with enthusiastic acceptance by foundrymen because it supplies an important need in the foundry for an efficient, low-cost method of blowing small, intricate cores. It requires no large volume of air and readily lends itself to handling a variety of core boxes. In fact, they tell us that it is the ideal method of making cores in single or gang boxes requiring a maximum of 2 lbs. of sand.

SAND CARTRIDGES AVAILABLE IN 8 STANDARD SIZES

Blower comes complete, ready to use. Each blower provided with one Size "C" sand cartridge which is adaptable to a large range of core boxes. Cartridges are available in seven additional standard sizes and special sizes furnished where needed.

★ Cartridge Bench Core Blowers

Redford IRON & EQUIPMENT CO.

Phone: REdford 8610

21315 West McNichols Rd. Detroit 19, Michigan

(*Concluded from page* 210)

chaste salutation is just another example of 'The letter that is dictated, but not read'? Certainly I shall greatly appreciate your courtesy in temporarily dropping all your research activities, to set me straight on this vitally important subject. 'Miss' indeed! G-r-r-r, and so forth! Yours very truly and masculinely, Old Bill himself.' "

"Not a bad job at all," I said. "That should put the lad in his place."

"You are just one letter short. My correspondent was not a lad, but a lady, and now I am in the dog house."

Starts Research on Eye Protectors

To aid in furthering the eye protection of industrial workmen, a new research program has been initiated at Battelle Institute, Columbus, O., under the sponsorship of the American Society of Safety Engineers, Engineering Section of the National Safety Council.

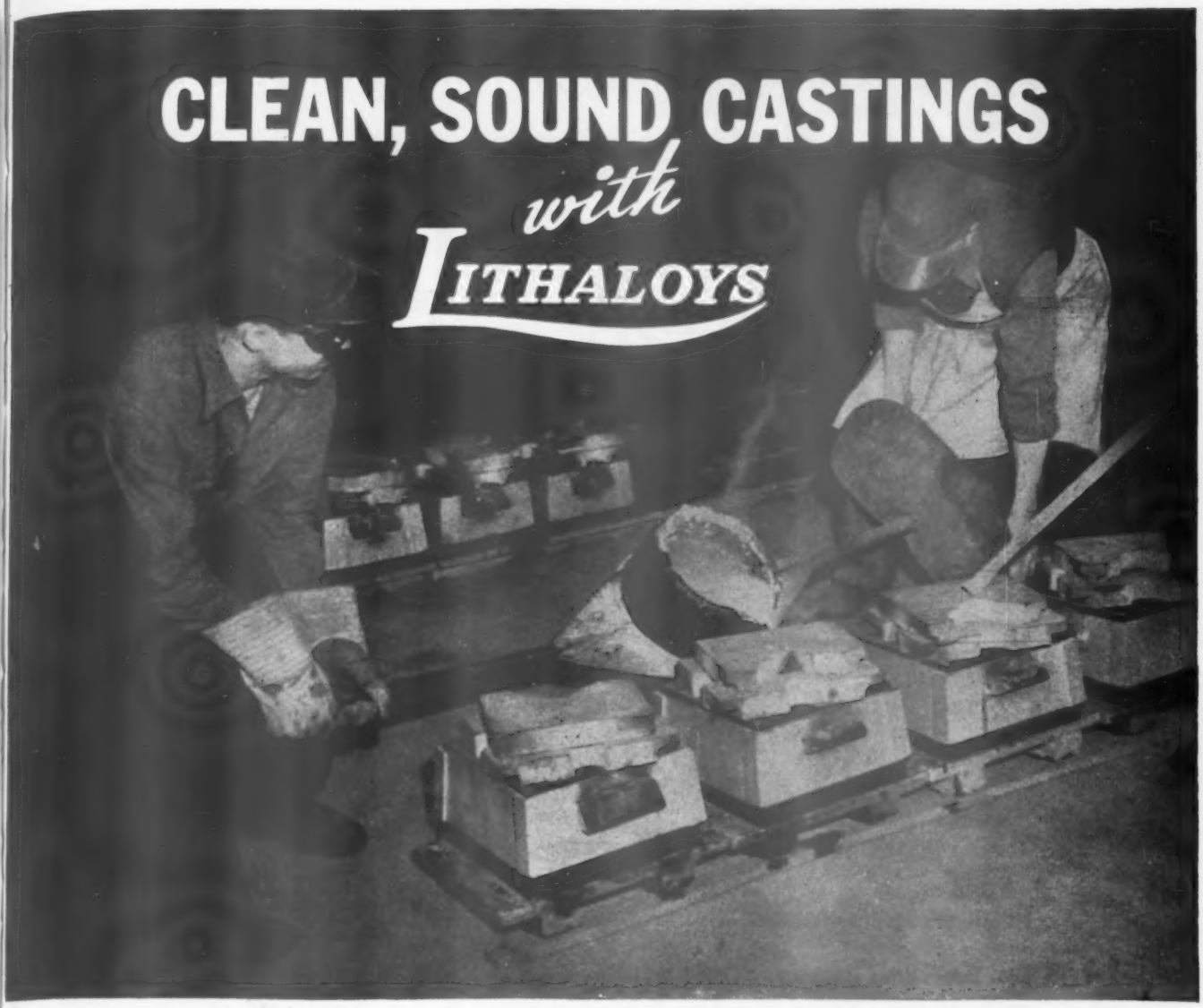
To involve a year of investigation, the program is intended to provide information that will be used by Safety experts and eye-protector manufacturers to help in combating the same 75,000 disabling eye injuries and several hundred thousand nondisabling injuries that occur annually in American industry. The investigation will apply particularly to the evaluation of the performance requirements and specifications of satisfactory plastic eye protectors, such as goggles and face shields, which are now finding increasing use in industry.

The research by Battelle will include both laboratory and statistical investigations. A field survey of present experience with various types of plastic eyepieces will be made to study the types of devices in use, nature of hazards, protection experience, evidence of eye strain, acceptance and use by workmen, and other evidences of advantages or disadvantages. Proceeding concurrently will be physical and optical tests to determine adequacy of protection, design, light transmission, eye strain and fatigue, and other factors. The combined data will be used by eye-protector manufacturers in setting standards for their products and in industry for the specification of desirable types of protectors.

Prepares New Fire Extinguisher Guide

Randolph Laboratories Inc., 8 East Kinzie street, Chicago, has a new "Fire Extinguisher Installation Guide" to help mobilize employe fire fighting and illustrate which extinguishers should be used and installed for the different kinds of fires that may occur. Posted over every fire extinguisher in the plant, the chart attracts the attention of employes and quickly shows them the correct use for extinguishers. Quantity copies are available without charge.

CLEAN, SOUND CASTINGS *with* LITHALOYS



LITHIUM treated melts of copper, tin bronze and silicon bronze consistently yield castings more uniformly free from porosity and gas cavities. At the same time, Lithium treatment effectively removes non-metallic impurities. As a result the castings have optimum physical characteristics.

Lithium treatment is simple. A few minutes before pouring, Lithium metal is stirred into the melt in the form of a stable master alloy containing a small percentage of Lithium combined with other metals to match the melt.

Lithium combines with hydrogen, nitrogen, oxides, sulphides and other non-metallic impurities. The compounds so formed are of non-metallic nature, and have low specific gravity. They are insoluble in the metal and flux out quickly.

This effective treatment costs only a small fraction of the price of *one* reject, and requires no special equipment, training nor departure from conventional foundry practice. Our technical staff, with over 15 years' experience in the Lithium and foundry fields will help you investigate.

LITHALOYS CORPORATION

444 MADISON AVENUE, NEW YORK 22, N. Y.

Are you paying your coremakers a high hourly rate to **MAKE CORES** . . . . . or to

STRAIGHTEN WIRES?

DX 5-Roll Core Wire Straightener

In any foundry where reasonable amounts of core wire are used, management is faced with two problems: the used wire can be chalked up to waste, or straightened by hand. Both conditions are costly. The solution is a KANE & ROACH CORE WIRE STRAIGHTENER. It reclaims used core wire quickly, cheaply and efficiently, over and over again, just as long as the wire remains usable. Foundries in which they are installed report an average saving of $100. a month in total salvage and man hours, not to mention increased production. Machines can be furnished in two sizes with 5, 8 or 9 rolls. Capacity DX Machine—1/8" to 3/8": F Machine—3/16" to 3/4". A Shear can be furnished for use with this Straightener for straightening and cutting new coil stock to length. Because we have been building and designing Straighteners since 1887, we feel that our knowledge and experience may help you. We will be pleased to send you specifications and other data on request.

K & R

KANE & ROACH

INCORPORATED
SYRACUSE, N. Y.
ESTABLISHED 1887

CONTROL IN THE GRAY IRON FOUNDRY

(*Continued from page* 89)

dling is the secret, plus the realization that a cupola is a delicate piece of machinery and must be treated as such. The cupola can, and does, produce metal under almost unbelievable conditions, but to produce irons of exacting qualities consistently it must be properly handled.

Technical control is the answer, of course. In the average foundry organization technical control should be divided into laboratory, metallurgical processes, pattern and equipment inspection, quality control, and final inspection.

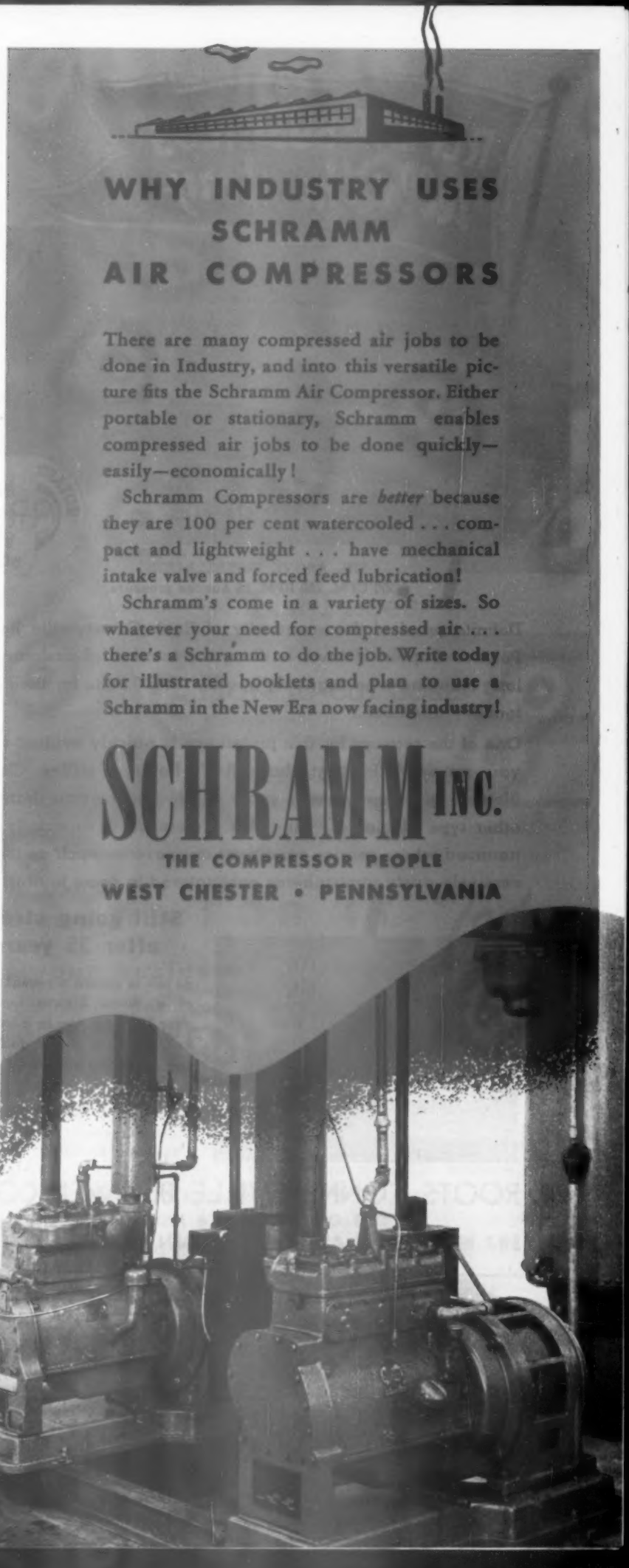
In order to see the full effect of technical control, and to understand why it is necessary to subdivide control, let us follow pig iron and the other foundry raw materials until they leave the foundry as a casting, a clean casting, accurate in dimensions, and conforming to specification.

Raw materials, such as pig iron, steel scrap, coke and sand, should be bought to specification; and the chemical laboratory is responsible for the testing of all incoming raw materials before their release to the foundry. When raw materials have been accepted, it is the responsibility of metallurgical process control to see that they are used properly and in correct proportion.

Control Cupola Operation

Metallurgical control supervises all cupola units and the method of charging and melting. Its responsibility is to insure that the casting is made to the required metallurgical specification by rigid metal control. All charges should be carefully weighed and charging should be done according to a prearranged method. The best method of charging is to cone the coke split slightly, to place the pig around the wall, place the steel in the center, then charge the purchased scrap uniformly over the pig and the steel, and level up as much as possible with returns. Foundrymen have heard these statements before, but my experiences indicate that they bear repetition.

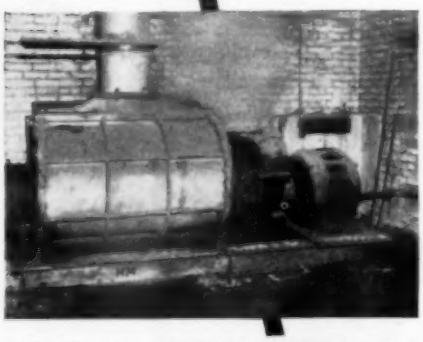
Further, each tap of metal should be tested before it leaves the cupola by some form of chill test to assure correct metal composition and to provide a record of each tap. Not long ago, during a foundry visit, I noticed a mold in front of the cupola. This mold obviously was used to pour chill tests. When the foundry superintendent was asked if the pouring of chill tests was standard practice, he assured me that it was. On the following day, however, as I passed the cupola when the heat was on, I noted that very same mold was in front of it. Sand marks and some dust made it obvious that no chill tests had been poured


WHY INDUSTRY USES SCHRAMM AIR COMPRESSORS
There are many compressed air jobs to be done in Industry, and into this versatile picture fits the Schramm Air Compressor. Either portable or stationary, Schramm enables compressed air jobs to be done quickly—easily—economically!
Schramm Compressors are *better* because they are 100 per cent watercooled . . . compact and lightweight . . . have mechanical intake valve and forced feed lubrication!
Schramm's come in a variety of sizes. So whatever your need for compressed air . . . there's a Schramm to do the job. Write today for illustrated booklets and plan to use a Schramm in the New Era now facing industry!
SCHRAMM INC.
THE COMPRESSOR PEOPLE
WEST CHESTER • PENNSYLVANIA

THE ABOVE INSTALLATION
4500 CFM, 290 RPM, 16 ounces pressure

Definite proof of the superiority of Roots-Connersville Rotary Positive Cupola Blowers is the great number of customers of long standing who regularly specify "R-C" units for their new foundry additions.

One of the reasons for this preference is quickly evident when you consider the fact that "R-C" Rotary Positive Cupola Blowers give many more years of efficient service than any other type of blower. And this preference is especially pronounced where service conditions are severe—such as the excessively dusty atmospheres encountered in some foundries.



Still going strong after 35 years

At left is shown a recent photo of a Roots Blower installed over 35 years ago in a foundry in Ohio. It is still in daily use and operating efficiently.

Photo at top of page shows an additional "R-C" Cupola Blower recently installed at this same foundry.

ROOTS-CONNERSVILLE BLOWER CORP.
ONE OF THE DRESSER INDUSTRIES
507 MADISON AVENUE, CONNERSVILLE, IND.

WRITE FOR BULLETIN 22-B-12

Roots CONNERSVILLE SINCE 1854 — Rotary Positive CUPOLA BLOWERS

the day before. This was brought to the attention of the superintendent. He called to Joe, the cupola man, and said he wanted chill tests poured. Whereupon the cupola man took a hand shank, caught some metal and quickly poured five chill tests from the same ladle. This, certainly, is not the kind of control to which I refer.

Selection of the correct sand mixture is an important phase of quality control. Selection of the sand mixture is dependent upon several factors: Size and shape of the casting and its service requirements, the type of iron used and the dimensional accuracy and other qualities required.

When the quantity under production is large enough, metal patterns and special molding equipment may be necessary. Under present day conditions, it is not impossible to hold some castings to a tolerance of ± 0.01 inch with special equipment.

Before a pattern goes to the molding department it should be examined by the pattern and equipment inspection department to determine whether it is in condition for production and whether or not dimensions are correct. With the co-operation of the quality department, the gating and risering methods are developed and checked with trial castings. All equipment is thoroughly inspected and the molder is given, as far as humanly possible, equipment and patterns capable of producing a casting to dimensions.

Department Exercises Control

The casting, now completed, is delivered to the cleaning department and from there to final inspection. Rejected castings are passed to the quality department for investigation and correction. The quality department should have full authority to stop a job to alter patterns or equipment if it is not satisfied that the castings will meet customer's requirements.

If final inspection is satisfied that the casting is O.K., it is shipped. But the story does not end with shipment. The consumer has to machine the casting and probably submit it to further tests. It is possible that heat treatment may be required for further physical properties.

Defective castings for which the foundry is responsible must be replaced at the foundry's expense. Trade custom has established that a casting in service is no longer a liability of the foundry. Continued failures, however, would not be conducive to continued success of the foundry's business. Continued failures can, as we well know, give the foundry industry and its product a bad reputation.

Careful records should be kept on every step in the production of castings to assist in maintaining as high a quality as possible.

While the form of technical control outlined may not seem practical for the small foundry, it can be made very practical, even if all of the duties have to

(*Continued on page 218*)

Get this booklet . . .

A NEW BUYING "TOOL" FOR EVERY ABRASIVES USER!

"Steelbac" safety features

—adaptability—economy

List Prices

How to cut costs

Grinding data

48
FACT-PACKED PAGES

WRITE FOR IT *Today*

on your business letterhead—*IT'S FREE!*

You will find this booklet helpful—a timely and practical reference on grinding and abrasive wheels . . . with added facts on Besly Titan resinoid bonded Steelbacs—the first successful bolted-on abrasive wheel . . . Also, complete data on how to buy.

In specializing in resinoid bonded abrasives, Besly has originated and developed many new uses for wheels of this type. "Steelbacs"—noted for ease of mounting, safety, long life and other advantages—are handling an ever-increasing variety of grinding jobs—accurately and economically

When you have a grinding problem, ask Besly engineers for advice—no obligation, of course. Write or phone today.

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BESLY TAPS • BESLY TITAN ABRASIVE WHEELS

CHARLES H. BESLY AND COMPANY, 118-124 N. Clinton St., Chicago 6, Ill. • Factory: Beloit, Wis.

(*Continued from page 216*)

be centered in one man. Moreover, technical control must be exercised if gray iron foundries are to meet successfully the competition they will face after the war.

To stress that foundry technical control is an absolute must, I should like to cite a few horrible examples of lack of control. I probably should discuss good practice, but I never cease to be amazed at some of the poor and costly practices into which foundrymen gravitate.

As a premise, I do not concede that there is a foundry problem that cannot be solved by the use of "common horse sense and simple arithmetic." Our real trouble is that when we are in difficulty, we become so engrossed with the problem that in daily contact, it looms larger and large until we lose a sense of proportion. The thing to do is to relax and attack the problem with a little science and a lot of "horse sense."

Not long ago a foundry was having considerable difficulty with a twin V-type air-cooled air compressor cylinder. At the point where the fins taper into the crank case—one of the thinnest sections of the casting—a shrink about the diameter of a lead pencil developed consistently. The fault did not show up—it never does—until the final machining operation. Everything had been tried, so they said—different gating, chilling, the core vents had been checked, etc. Around the shop dozens of sections cut out of the cylinder were available, but no one had ever taken the trouble to break up one of the castings to look at the structure. When this was done, however, the very coarse structure made it immediately evident that the iron was not properly balanced for the section. A check of the analysis disclosed that the total carbon was 3.50 per cent with a 2.40 per cent silicon. Had the section been uniform that analysis would have been right for the ⅜-inch section, but the adjoining sections, a quarter-inch away, were 1 inch and ¾-inch, respectively. It really was a poor design; but high carbon, high silicon iron in the heavy sections remained fluid long enough and radiated sufficient heat to keep the adjacent thin section fluid also. This meant that the heavy sections drew metal from the thin section and caused shrinkage. The cupola set-up was such that it was impractical to run a lower carbon iron, so the silicon was reduced 0.50 per cent. This gave a 1.90 per cent silicon in the final casting and the trouble disappeared.

The reason for the disappearance of this trouble is very obvious—the cooling rate was accelerated by the lowering of the silicon, causing the heavier sections to freeze before metal could be drawn from the thin section.

Blow Holes Persist

A short time ago an automotive foundry was experiencing a large amount of scrap on a water-jacketed diesel exhaust manifold. There were three bosses on the cope side which served no purpose other than to give sufficient metal to bolt cover plates over the holes through which core prints projected to center the jacket core. But for four months 40 to 60 per cent of the castings produced were blessed with a blow in one or more of these bosses. And the blow holes scrapped the casting.

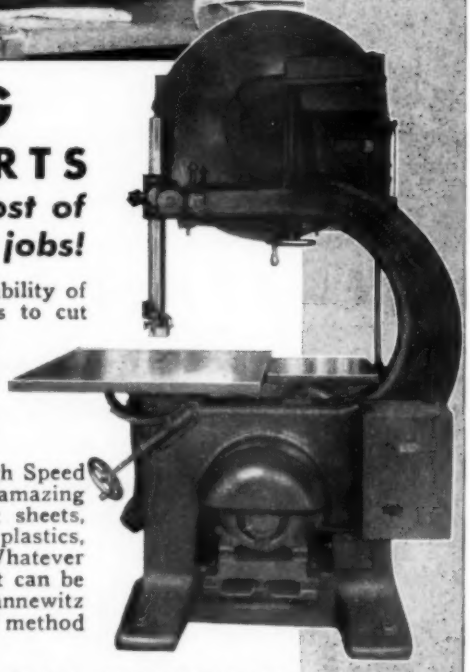
Here again the foundry had tried different gating, checked core vents, put in extra core vents; but nothing had happened except that the blow proceeded from one boss to the next. The core prints projecting into the cope were rather thin and naturally inclined to break off. To stop this trouble, nails had been inserted in the box before the core was blown to give added support. In the completed core, in almost every case, the nails cut through the side of the print, so they were covered with soapstone core patch just before the cores were placed in the molds. It had been observed that the soapstone did not dry very rapidly with just water added, so core oil was added in the belief that this would hasten drying. To the touch the paste was dry, but the result was a "Williamson riser." The minute hot metal hit the patching material it blew, as would be expected.

The solution of this problem was also simple. The core oil was removed from the patchign material, and, after patch-

(*Continued on page 220*)

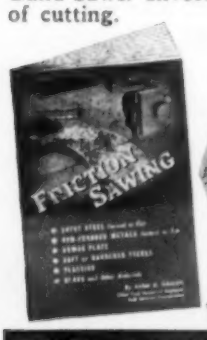
The SUPER METHOD

of TRIMMING FORMED PARTS
and performing a host of other metal cutting jobs!



The negligible down-drag and the ability of Tannewitz High Speed Band Saws to cut sheet metal from 90° to near 0 or 135° at tremendous speed make these machines ideal for trimming. Cuts can be made with perfect safety without using a rest of any kind.

Friction sawing with Tannewitz High Speed Band Saws also results in perfectly amazing time savings in the cutting of flat sheets, soft or hardened steels, armor plate, plastics, glass and many other materials. Whatever your cutting problem, chances are it can be done better and faster with Tannewitz Band Saws. Investigate this "Super" method of cutting.



FRICTION SAWING with Tannewitz HIGH SPEED BAND SAWS

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THE TANNEWITZ WORKS GRAND RAPIDS 4, MICHIGAN

The Pace of Victory Permits Only A Congratulatory Handshake!

American Industry well merits a decoration for its brilliant record in the Mighty 7th! But, as our newly decorated Pacific heroes quickly return to combat, so industrial leaders aren't resting on their laurels. ***Back into Bond action***—they are now busy consolidating recent Payroll Savings Plan gains!

First, many executives are now patriotically working to retain the substantial number of new names recently enrolled during the 7th War Loan. By selective resolicitation, they are urging all new subscribers to maintain Bond buying allotments.

Second, many are also employing selective resolicitation to urge every worker who increased his or her subscription in the 7th to continue on this wise, saving-more-for-the-future basis.

Help to curb inflationary pressures and harvest peacetime prosperity by holding the number of Payroll Savings Plan subscribers—and amounts of individual subscriptions—to the mark set in the Mighty 7th!

The Treasury Department acknowledges with appreciation the publication of this message by

THE FOUNDRY

★ *This is an official U.S. Treasury advertisement prepared under the auspices of Treasury Department and War Advertising Council* ★

(*Continued from page* 218)

ing, the cores were placed in the oven for one-half hour. There were no more blows.

These cases are not unusual. Case after case can be cited in which the solution could have been easily found had the personnel though the problem through clearly. These are examples of lack of control, and lack of control will, sooner or later, be reflected in the earnings statement.

In the first example, 1000 castings which would have sold for $25 each were involved. The second case involved 2500 castings which would have sold for $14 each. Surely, losses of $25,000 and $35,000, respectively, would cut into the profits of any foundry, regardless of size or type.

I should like to cite one example on operation. Not long ago, I visited a foundry which had a new cupola, new charging equipment and an excellent set of scales. During the charging procedure the buggies, which were loaded in the yard with each of the units of the charge, were run over the scales and the loads were stopped, but no adjustments were ever made. Now mind you, a man stood at the scales to check each load, but failed to do so, probably because he lacked interest. The charge was to consist of 2000 pounds, made up of 1100 pounds of cast scrap and returns, 350 pounds of steel scrap and approximately 550 pounds of pig with a 275-pound coke split. The cast scrap varied from 100 to 200 pounds over on several loads and the steel scrap was 50 to 100 pounds under on several loads. The pig iron was approximately correct, but the coke was consistently 75 to 100 pounds over on each load.

This particular foundry was attempting to produce quality castings, but what was happening to their quality and to their costs by such methods? The steel scrap, off 14 to 43 per cent of the required amount, would raise the silicon .15 per cent and the carbon a proportionate amount. The cast scrap would also fluctuate the analysis, depending on the type of scrap and the amount of ambition possessed by the men at the time each buggy was loaded.

The coke overloads caused the most difficulty. The fact that the coke was increased by about 35 per cent would slow down melting, cause lower temperature iron and produce more scrap castings. This fluctuation of coke was the reason the coke ratio was 1 to 7.2 instead of 1 to 8.5 or 9, as it should have been. Fluctuation of the metal charges was the reason the coke ratio had been lowered to give usable metal temperature.

Saving To Be Made

Had the metal charges been of uniform weight, the coke ratio could have been 1 to 9. Throwing money away? Let's see. Coke, it is said, is the cheapest material used in the cupola, but this foundry was melting 30 tons a day. The overweight of 100 pounds on each load and the 50 pounds to be saved by uniformly weighed charging offered a possible saving of 4500 pounds of coke per day. This Midwest foundry paid $13.35 per ton for coke, hence the saving would be $30 a day. Coke may be the cheapest raw material used in the cupola, but why not use it profitably and with the very best technical knowledge?

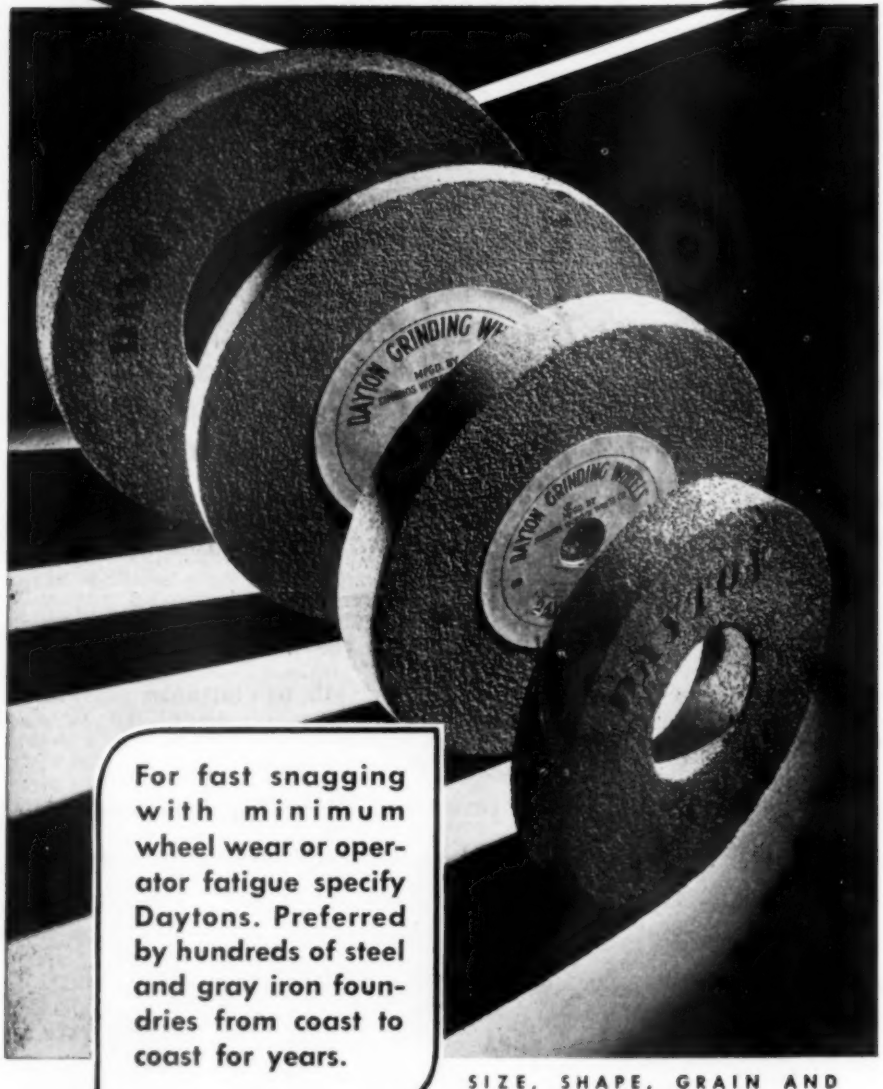
Control, and all it implies, can effect remarkable changes and produce very marked results. Let me recite the case of a small captive foundry melting approximately 5 tons a day. The treatment can be applied and like results achieved in any foundry, small or large.

About a year ago, when I made my first call at this particular foundry, it was in terrible shape. Scrap was running 15 per cent. Employes were very dissatisfied. Physical working conditions were extremely bad. Working space was cluttered with flasks and heaps of unused sand. The men couldn't find anything to work with, such as gaggers, decent flasks, etc. Sand conditions were exceedingly bad; the only bond present was the high moisture content, guessed at about 13 to 14 per cent.

The scrap was caused by misruns, cold shuts, slag, runouts, blows, etc. The castings under production were not of a difficult variety; their section average

(*Concluded on page* 222)

DAYTON
SNAGGING WHEELS



For fast snagging with minimum wheel wear or operator fatigue specify Daytons. Preferred by hundreds of steel and gray iron foundries from coast to coast for years.

SIZE, SHAPE, GRAIN AND GRADE REQUIRED.
WRITE, PHONE OR WIRE.

SIMONDS WORDEN WHITE CO.
710 NEGLEY PLACE, DAYTON 7, OHIO

The PATTERN SHOP

No casting can ever be better than the pattern from which it is made.

And that little thought of the month brings us to a discussion which is even more interesting to the foundryman than the patternmaker. The pattern is the foundryman's most important tool, and if he uses sloppy patterns he will inevitably produce sloppy castings; but if he specifies that superior workmanship, materials and supplies go into his patterns, he greatly increases his ability to make superior castings.

For instance, if he requires that all leather, wood and Bull's-Eye fillets be

applied with the new MASTER fillet cement, his castings will be cleaner and he will save time in the finishing room, because this cement is waterproof and heat resistant, and therefore will not grow tacky and pick up sand.

If the foundryman specifies that MASTER Pat-Kote be used instead of shellac to coat patterns, his principal tools will last much longer and do a better job as long as they last. MASTER Pat-Kote penetrates the wood instead of piling on, is not affected by water or core oil, and resists sand abrasion and rough handling. Available in liquid form in clear, clear orange, black, chrome yellow, green and vermilion, MASTER Pat-Kote is easy to apply and dries quickly. It hardens just as readily over wax fillet as over wood, and will not craze or peel, and will stand 220° F. before softening. It can also be applied over already shellacked surfaces, and can be used over metal by first applying MASTER metal primer.

Both foundrymen and patternmakers who want to improve their products may obtain further information and prices by writing the Kindt-Collins Co., 12651 Elmwood Ave., Cleveland 11.

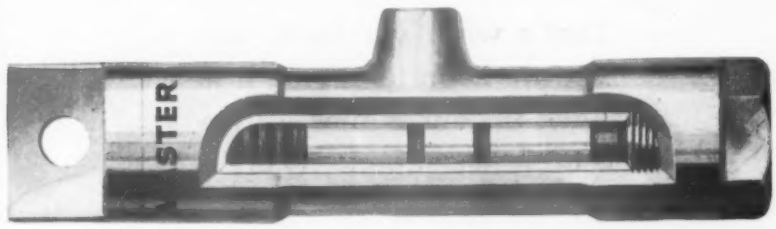
In the Future . . .

The trends pertaining to certain fundamentals in patternmaking are changing. The results of our Research and development divisions will be announced from time to time. To "HELP ELEVATE PATTERN AND FOUNDRY ENGINEERING" has been our slogan for 32 years.

MASTER Vibrators

If you need a vibrator which will never stick, which operates with minimum friction, which requires no lubrication, which can be adapted to any special equipment and which will give satisfactory results on the toughest jobs —you need a MASTER vibrator.

These rugged, precision-fitted vibra-

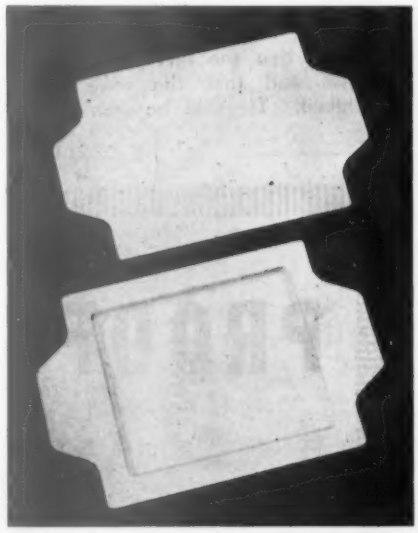


tors use less air because their scientific design establishes the correct relation between the air ports and piston stops, producing a perfectly balanced vibrator operation. They cannot stick because the special alloy bronze piston bearing cannot corrode or rust. Write the Kindt-Collins Co., 12651 Elmwood Ave., Cleveland 11, for specifications and prices.

Cast Aluminum Pattern Plates

You may not think of pattern plates as a profit item in your foundry, but actual job records show that Master cast aluminum plates bring definite foundry profits through their superior performance. They lower cleaning room costs because they are accurately cast. They prevent ramoffs and sand shifts because their satin finish grips the sand with invisible teeth, and wear longer because of their skin hardness.

The flat type can be furnished in standard or special sizes to order, and for a small extra charge are supplied with cast holes for flask pins. Master offset pattern plates, likewise made of MASTER Aluminum Pattern Alloy (MAPA Metal), have greater strength and rigidity, and are preferred in many mod-



ern foundries. All corners and edges of both types are rounded and smoothed to facilitate handling. For full data, write the Kindt-Collins Co., 12651 Elmwood Ave., Cleveland 11.

New Bulletin

A disc grinder using either heavy-duty abrasive wheels or thin abrasive discs, for either foundry or pattern shop, is described in Bulletin B-1, just off the press. Write today for full information and specifications.

KINDT-COLLINS MASTER PRODUCTS

THE KINDT-COLLINS CO.

Everything for the Pattern Shop

12651 ELMWOOD AVE. • CLEVELAND 11, OHIO

(*Concluded from page 220*)

was ⅝ to ¾ inches. The bulk of the scrap was caused by pouring low temperature iron. Metal at the cupola spout did not go above 2600 degrees Fahr. during any part of the heat and pouring temperatures varied from 2300 to 2400 degrees Fahr.

The cupola was running an 11-ounce blast, and the bed was in by weight and ran 30 inches above the tuyeres. Coke splits were not weighed or measured, except by number of forks.

It was recommended to the superintendent that the bed be raised to 42 inches and that the coke splits be weighed. He said he would see that these things were done, but he ordered the cupola man to make no changes. The bed height was changed the next day, however, because the superintendent did not show up for work. Metal temperature at the spout that day ran from 2700 to 2800 degrees Fahr. Later we were informed that scrap had run much lower.

The attitude of the men, the condition of the foundry, the absence of control could be traced to the superintendent. It was recommended that a change be made in supervision.

A short time ago a second visit was requested by this foundry. The change was remarkable. The foundry had been cleaned up. The men were happy and producing about twice the tonnage of a year earlier. Sand had been changed. The cupola was pouring out excellent iron which ran from 2710 to 2800 degrees Fahr. throughout the heat. Scrap had been reduced to 4.5 per cent, average.

All recommendations had been followed. The management stated that the physical clean-up had cost about $500, and the company was ahead about $6000 because of increased efficiency.

In conclusion, I would emphasize that the foundry industry is not, as some in high places assert, a dying industry, "dragging tottering feet to the grave of obsolescence." The foundry industry is young, progressive and growing lustily, and has its best days before it.

It has its potential markets, broadly distributed over the entire range of material applications; and, as I am certain that the future will make new and greater demands of it, I feel safe in the prediction that the immediate postwar period will offer this great industry a potential market greater than it ever had in peacetime.

In the tremendous pent-up, steadily expanding domestic demand for household, farm, transportation, industrial and construction equipment, and in the great tonnages of goods which will be required to put war-wrecked Europe and the Far East back into production for peace, are castings market potentials far greater than the industry has had in prospect in any decade in its history.

We may look for intensified competition for the castings market from other manufacturing processes as we reconvert to peacetime production. I do not believe, however, that this competition will make serious inroads, since the engineering field recognizes that the castings process is the short, economical manufacturing route between raw materials and finished parts; and this awareness, if we maintain it by publicity and promotion, will continue to bulwark the foundries.

Nevertheless, we must remain constantly aware that throughout every business day we are molding our own future and that if we are to make the most of our postwar opportunities, we must continue to engineer our materials to still higher levels of quality by technical control, give increasing attention to cost controls, introduce further production economies and market castings more aggressively.

Publishes Guide for War Contractors

"Army-Navy Guide for Prime and Subcontractors," obtainable without charge from the Readjustment Distribution Center, 90 Church street, New York 7, has been issued jointly by the War and Navy Departments. Intended as an outline for contractors, it suggests methods of advance planning and illustrates practical procedures for settlement of terminated contracts.

PROOF APLENTY!

That's what we have and we are keen to submit it to back up our claims on the established superiority of . . .

SAHARA BELT for hot sand-handling . . .

REXALL BRAND for castings and cold sand.

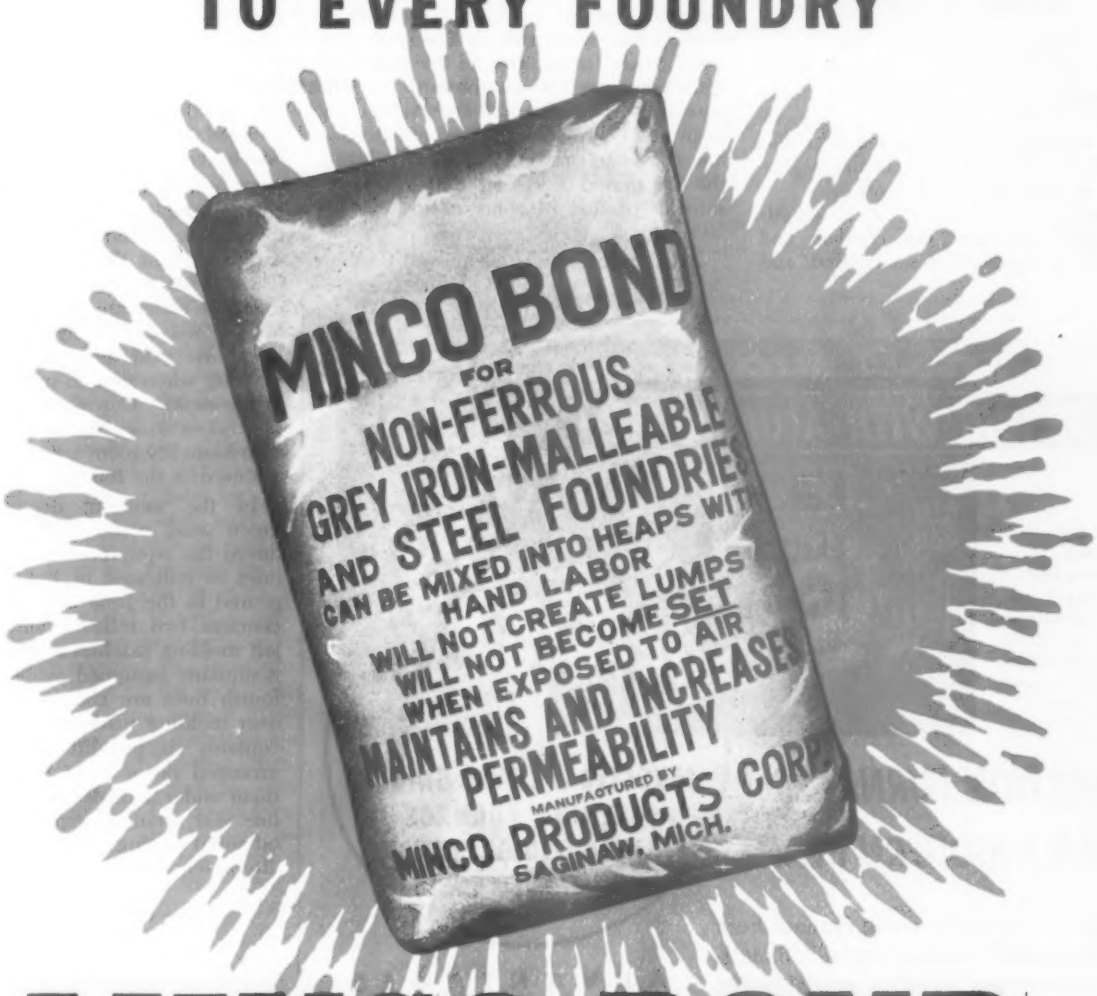
PREWAR QUALITY —
NO SYNTHETICS —
GOOD DELIVERIES.

IMPERIAL BELTING COMPANY

1750 S. KILBOURN CHICAGO 23, ILL.

Now Available

TO EVERY FOUNDRY



MINCO BOND

MAINTAINS and INCREASES PERMEABILITY

The time has come, to the foundries of America, when price and quality again are of major importance; when maximum production must be attained for every man hour employed.

If MINCO BOND is substituted for one-half the quantity of Western Bentonite customarily used in your molding sand, high flowability will be achieved, permeability will be slowly increased, cast blows will be eliminated, shake out and cleaning costs will be lowered, scrap losses due to sand failure will be reduced and you will have high collapsibility and much smoother castings, and with all these valuable characteristics you will maintain the same green strength as before. Green strength can be carried at 12 lbs. and over, yet the sand will start flowing immediately upon opening the hopper, hardly need to open hopper more than 2", the shake out will be rapid and free.

THIS COMBINATION OF MINERALS IS THE BEST THAT FOUNDRY SCIENCE TODAY CAN GIVE YOU.

MINCO BOND does not expand or contract. It has high dry strength at room temperatures and because of these characteristics it is also valuable in the manufacture of various types of cores where it is not desirable to use oil. MINCO BOND is making the motor block core in the Sherman tank motor, without oil, WITH A SAND SLINGER, and is doing a mighty good job.

NOW IS THE TIME, WHILE RECONVERTING, TO GIVE MINCO BOND A TRIAL.

MINCO PRODUCTS CORPORATION

SAGINAW, MICHIGAN

WARNER R. THOMPSON CO.
7818 Hamilton Ave., Detroit, Mich.

THE BUCKEYE PRODUCTS CO.
7620-34 Vine St., Cincinnati, Ohio

MARTHENS COMPANY
1205 4th Ave., Moline, Ill.

FOUNDRY SUPPLIES CO.
451 W. 33rd St., Chicago, Ill.

HOFFMAN FOUNDRY SUPPLY CO.
1193 Main, Cleveland, Ohio

WM. R. BARNES COMPANY, Ltd.
243 Cumberland Ave., Hamilton, Ont.

WOLVERINE FOUNDRY SUPPLY CO.
3211 Bellevue, Detroit, Mich.

SHANAHAN'S LIMITED, Vancouver, British Columbia • SHANAHAN'S LIMITED, Winnipeg, Manitoba

MAGNESIUM CASTINGS FOR AIRCRAFT

(*Continued from page 99*)

motion the hydraulic and vibrating mechanisms of the core machine, and the bed of the machine with its attached corebox is raised, rolled over and lowered to an equalizing frame at the end of a short roller conveyor.

A wooden bottom board on the equalizing frame receives the corebox and plate. The coreplate is unclamped, and with the corebox in vibration, it is raised slowly, leaving the core and coreplate resting on the bottom board. The latter are moved manually along the conveyor from beneath the machine. The corebox is rolled over and readied for another coremaking cycle. The bedding frame is removed carefully from the core, which then is transferred to the platform conveyor for transportation to the core oven. Before any core enters the oven it is sprayed with water from a fine nozzle to prevent skin drying during the first period of baking. Skin drying results in peeling of some of the surface layer.

After baking the cores are put through a series of finishing and checking operations, and a number of core assemblies are put together. Cores first are given a thorough visual inspection for cracks, sags, broken places, soft spots, etc. Operators file off excess sand and sharp corners, patch soft spots and broken edges, strike off parting surfaces with strike-off sticks, blow off loose sand, and gage the cores to set that they meet size tolerances. Then certain cores are assembled and pasted, some being simple and others quite complex.

Overall clearance or tolerance on large core assemblies is held to within 1/32-inch. Completed assemblies are gaged, and then sent through drying ovens to dry the paste. After removal from the oven all chills are sprayed with a mixture of red talc or flyash, alcohol, shellac, boric acid and sulphur to prevent blowing when molten metal strikes them in the mold. Cores and core assemblies are taken from the conveyors to the core humidity room for storage until they are used in the foundry.

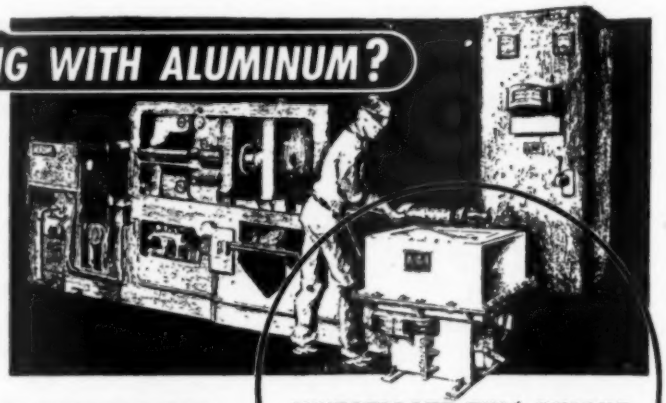
In the molding department where green sand copes and drags are produced the equipment is arranged in five lines as indicated in Fig. 11 which appeared in the June issue. The first line contains two rollover and two pin lift jolt molding machines. The second line is similarly equipped, while the third and fourth lines are comprised of four rollover molding machines each. The fifth contains six pin lift molding machines arranged on a turntable which carries them under a sandslinging machine. This line was arranged especially for making oil sump castings, and molding machines alternately carry cope and drag patterns.

Place Chills Around Flanges

A typical casting made on the first two lines equipped with jolt rollover and pin lift jolt machines is the rear housing. First operation in making the drag on the jolt machine is cleaning the pattern with a brush, followed by application of liquid parting and blowing off with an air hose. Then 28 chills are placed around the two flanges of the pattern, followed by locating the flask on the pilot and slot pins of the machine. A layer of sand is dropped into the flask from the overhead hopper, spread uniformly over the pattern and jolted 75 to 100 times. Another layer of sand is put in and jolted, and that cycle continued until the flask is full. Then the sand is butt rammed all over with a pneumatic rammer, and struck off. A thin layer of bedding sand is spread evenly over the mold, the bottom board rubbed into place, and clamped.

The mold is rolled over, dropped to the equalizing rollers, and the clamps unfastened. Vibrating mechanism is started, and the pattern withdrawn slowly from the mold. Pattern is rolled back, the mold picked up with a hoist and moved onto a long conveyor line. The drag is gaged with a template to see that it conforms to requirements, cleaned with a vacuum hose and 30 to 35 vent holes are punched through the bottom. Next operation is setting 17 cores singly

WORKING WITH ALUMINUM?



Typical layout for die casting, showing compact 20 KW Ajax-Tama-Wyatt furnace in position. Unit comes with complete control cubicle, as shown.

INVESTIGATE THIS UNIQUE HOLDING FURNACE for IMPROVED OPERATIONS and LOWERED COSTS!

INDUCTION FURNACES MEAN A MODERN PLANT..

In addition to the holding furnace here described, small, compact, twin-coil melting furnaces are likewise available for continuous production.

Rolling mills and foundries using Ajax-Tama-Wyatt units have *consistently* developed the highest physical properties in their aluminum products . . . with decreased gas absorption, absence of all segregation, and elimination of oxide inclusions and hard spots . . .

Clean-cut temperature control, great ease and simplicity of handling are operating characteristics. Ajax induction furnaces give you a modern plant, a cooler foundry, a better product. Significantly, too, they have been known to pay for themselves within less than six months. *Write for latest TW catalogs describing both Ajax holding and melting furnaces for aluminum!*

ADVANTAGES

- Every element of uncertainty is removed from holding furnace procedure
- Automatic, positive temperature control to within 5 degrees
- No segregation, iron pickup, or contamination — automatic stirring
- Always ready to operate — no heating up or waiting periods
- Pays for itself quickly by doing away with pot or crucible replacements
- Maintenance costs so low as to be virtually negligible
- Low operating costs — only 12 KW for holding continuously up to 400 lb.; 8 KW when covered on week ends
- Greatly improved overall foundry conditions inherent in induction melting

AJAX TAMA-WYATT INDUCTION MELTING FURNACE

AJAX ENGINEERING CORPORATION • BOX 1418 • TRENTON 7 • N. J.

AJAX METAL COMPANY, Non-Ferrous Ingot Metals and Alloys for Foundry Use
AJAX ELECTROTHERMIC CORP., Ajax-Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., INC., The Ajax-Hultgren Electric Salt Bath Furnace
AJAX ELECTRIC FURNACE CORP., Ajax-Wyatt Induction Furnaces for Melting

ASSOCIATE COMPANIES

and in combination, each core or assembly being gaged to 1/32-inch tolerance. First core placed is the ring core which is single. It is followed by the external core assembly, and then by a curved single core which, due to its shape, is called a "bologna" core. Last core to be placed is the internal assembly. After the cores are set the core setter adds a tag to the mold which contains his name and number, the shift and heat numbers. This tag continues with the mold and as it reaches the pouring station, shakeout and core knockout, the badge and shift numbers of the workers who performed the various operations are added.

Copes for the rear housing are made on pin lift jolt molding machines which are equipped with pins located under the four corners of the flask to give a uniform lift to clear the pattern. After cleaning off the pattern, the flask is set in position and partially filled with sand from the overhead hopper. Then the molders place a number of 60-penny nails around the runner gate for reinforcement, fill the flask with sand and jolt it. Excess sand is struck off, and the mold is lifted from the machine by the pins. The mold is picked up with an air hoist and sling and moved a slight distance from the machine where the molder carefully removes any loose sand from top and bottom of the mold with a soft hair brush, giving careful attention to the riser and sprue openings and the gating system. After blowing off the mold with an air hose, caulking compound is applied around the down sprue and runner to prevent any leakage between them when the molten metal is poured in. The finished cope then is moved over to the conveyor line and placed on a waiting drag.

Exhaust System Removes Smoke

The conveyor line carries the mold to the pouring station or shed, which is set off from the foundry proper by corrugated sheet steel construction and equipped with a powerful exhaust system to carry away the smoke and fumes. A continuation of the pouring shed forms the cooling chamber through which the molds pass prior to reaching the shakeout and core knockout grids. After these operations the castings are forwarded to the cleaning department where the gates and risers are removed, and numerous other operations are performed to provide a finished casting.

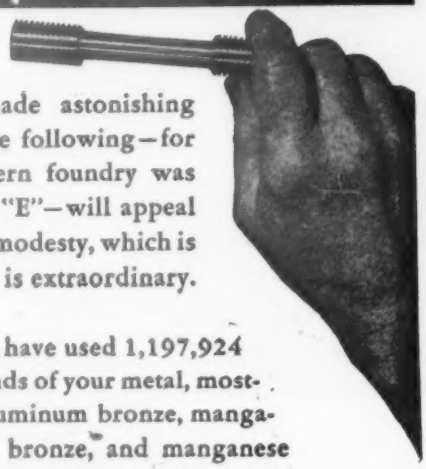
Gates and risers of castings, except for the supercharger front housing, are removed by band saws. Those of the supercharger front housing are cut off with a specially designed machine employing a saw head. The circular saw is steel with inserted tungsten carbide teeth, and as may be observed in Fig. 8 the motor driven saw mounted in a swivelling fixture is suspended from a horizontal slide arm attached to a post. This mounting permits the operators to adjust the saw accurately in position. The saw remains stationary while the casting clamped to the table is rotated under it by hand.

To save time in chipping off the remaining portions of large risers not completely removed by the sawing operations on the rear cover and front housing castings, machining operations are performed. On the front housing the stubs are removed with a 2½-inch diameter drill on a radial drilling machine, while those on the rear cover casting are taken off with a 3¾-inch diameter drill on a table drilling machine.

Excess metal around parting lines is removed with pneumatic chippers. Castings are abrasive blasted in equipment using No. 60 steel grit. Blasting machines are attached to exhaust equipment. Surplus metal around flanges and edges of castings is removed on double wheel stand grinders equipped with exhaust units.

All large exterior surfaces of castings are polished on double wheel polishing jacks. Wheels used are 12 inches in diameter and made of cloth. The periphery of the wheel is coated with hot glue, rolled in silicon carbide grit 4C grade and carefully dried in an oven before use. Chipping and drill marks and rough surfaces on the interior and exterior of castings are ball cut and polished out through a series of burring and buffing operations performed in a row of booths shown in Fig. 6. Booths are in pairs back to back with down-

REJECTS BELOW 1/4 OF 1%!
A Highly Expert Foundryman reports to AJAX



Nonferrous founders have made astonishing records in the last 3 years. The following—for which this representative eastern foundry was thrice awarded the Army-Navy "E"—will appeal to all foundrymen because of its modesty, which is typical, though the achievement is extraordinary.

Send for booklet
"INGOT METALS OF TODAY"

16 STANDARD INGOT METALS BY AJAX
Ajax Tombasil
Ajax Plastic Bronze
Ajax Anti-Acid Bronze
Ajax Phosphor Bronze
Ajax Red Brass Ingots
Ajax Manganese Bronze
Ajax High-Tensile Manganese Bronze
Ajax Golden Glow Yellow Brass
Ajax Nickel-Copper 50-50%
Ajax-Hamilton Gear Bronze
Ajax Manganese Copper
Ajax Aluminum Alloys
Ajax Phosphor Copper
Ajax Silicon Copper
Ajax Nickel Alloys
Ajax Phosphor Tin

NOTE
"Proper Melting Decreases Foundry Losses," contains interesting data. Also, the booklet, "Nonferrous Ingot Metals of Today." Write for both of these. They are free.

"We have used 1,197,924 pounds of your metal, mostly aluminum bronze, manganese bronze, and manganese aluminum bronze. All of this has gone into Army and Navy material. It has been subjected to severe tests, both chemical and physical, in castings weighing from ½ to 750 lb. each. A lot of this had to stand a hydrostatic test of 7,700 lb. On this production, we feel it safe to say that our rejects have been less than ¼ of 1% due first, to your fine quality of metal, and second, to our good luck."

We are always gratified to receive letters of this character, and take pleasure in placing it among many similar ones received during our 65 years in the metal business.

AJAX NON-FERROUS INGOT METALS AND ALLOYS FOR FOUNDRIES
ESTABLISHED 1880
METAL COMPANY · PHILADELPHIA

AJAX ELECTRIC FURNACE CORP., Ajax-Wyatt Induction Furnaces for Melting
AJAX ELECTROTHERMIC CORP., Ajax-Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., INC., The Ajax-Hultgren Electric Salt Bath Furnace
AJAX ENGINEERING CORP., Ajax-Tama-Wyatt Aluminum Melting Induction Furnaces

ASSOCIATE COMPANIES

draft exhaust through a water curtain. Rotary pneumatic motors and flexible shaft equipment drive the various burring and cutting tools and polishing wheels.

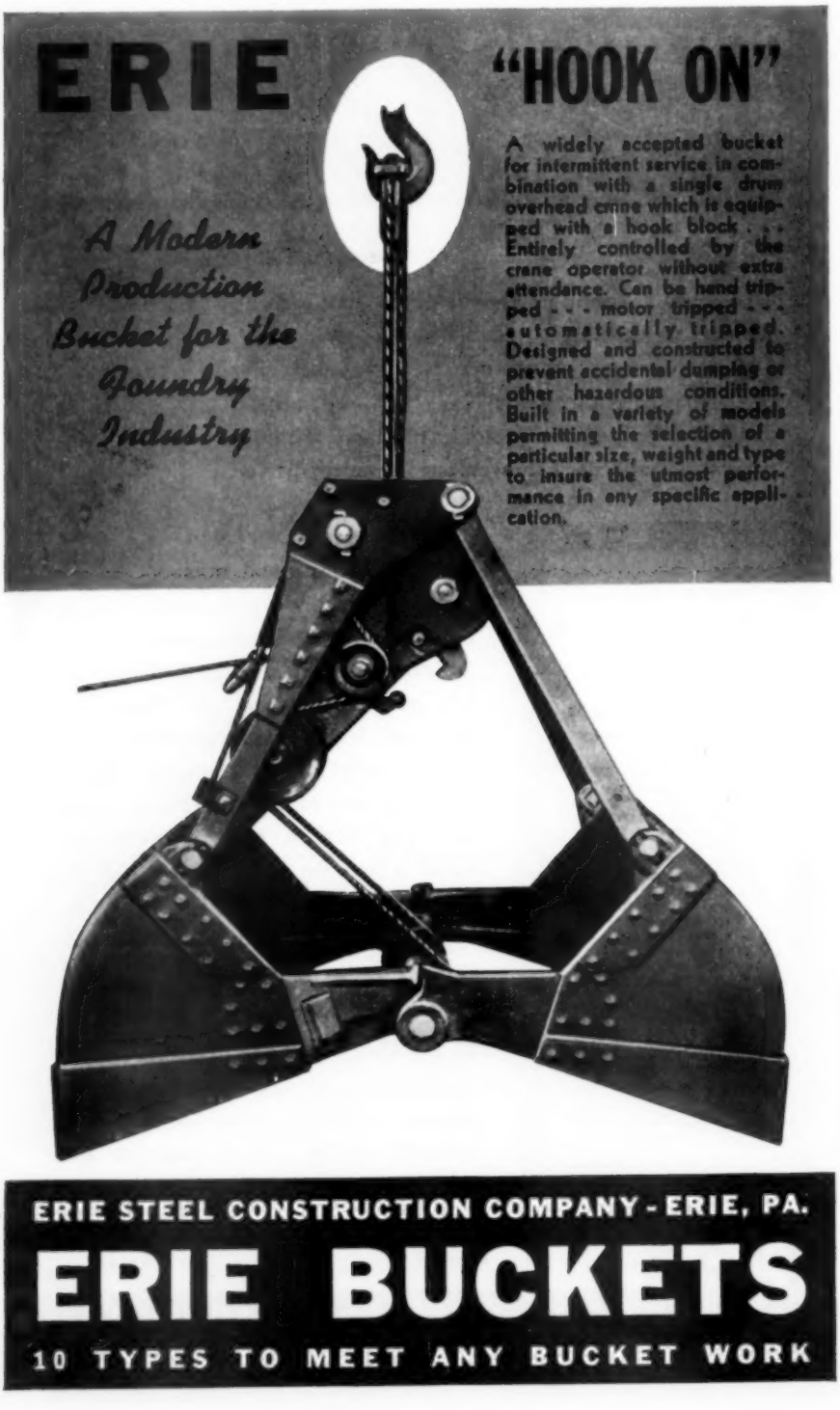
Castings are given a solution treatment followed by air quenching, and aging in two 66-foot continuous furnaces parallel to each other. The solution furnace is divided into three zones with automatic doors between each. First zone is maintained at 610 degrees Fahr., and the castings remain in the zone for 2 hours. Second zone is maintained at 625 degrees and the castings remain for 6 hours. The third and final zone of the solution heat treating furnace is maintained at 715 degrees Fahr., and the castings are held at that temperature for 16 hours. At the end of that period the castings are removed and given a forced air quench for 2 hours. Castings then go into the aging furnace for 16 hours at 350 degrees Fahr.

From 30 to 100 per cent of the castings are subjected to X-ray examination depending upon the castings and existing conditions. Equipment includes six machines of 50 to 140 kilovolt capacity. Castings are subjected to a leakage test wherein air under pressure is forced into the casting which is immersed in water. Any leakage is quickly indicated by the appearance of a stream of air bubbles rising to the surface of the bath. All castings are given a chromate coating for prevention of corrosion. The dichromate bath is composed of a solution containing 1½ pounds sodium dichromate and 1½ pints nitric acid to the gallon of water. After dipping, the castings are rinsed in cold water, then in hot water and finally are dipped in a bath of slushing oil.

Close inspection is maintained throughout from incoming raw material to the final, finished casting. Magnesium alloy ingot received from the producer is under the control of the inspection department until spectrographic and chemical analyses are made by the laboratory. The department checks and keeps records of all melting, remelting and heat treating operations. An inspector on the pouring floor, called the tagger, stamps a melt number on the tag, which is inserted in the riser of each casting and test bar poured. He assigns a melt number to the furnace ready to be poured; obtains spectrographic samples; checks ladle additions, etc. Prior to the shakeout the melt number is stamped on one of the risers so that if the melt tag is detached or lost, the casting can be identified.

After the core knockout operation the castings are subjected to rough inspection for such visible defects as misruns, sand holes, core shifts, shrinkage, cracks, etc. After the gates and risers are removed the castings again are inspected for sand, flux and blow holes, misruns, shifts, cold shuts and shrinkage cracks. All water or air testing for leakage is performed by the inspection department. Final inspection of the castings is performed after they and their accompanying test bars have been heat treated and reports received from the laboratory on the test bars. If the latter fail in any required specification the castings from that heat are scrapped.

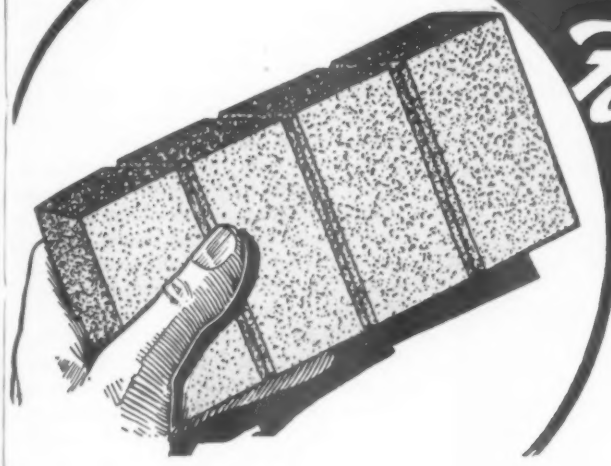
Castings are tested for brinell hardness and subjected to measurements with calipers, flush pin and profile gaging to see that they meet dimensional tolerances. Especial attention is given to wall thickness and other critical areas. At the same time a thorough check is made for any defects which might not have been detected, but which become visible after the various cleaning and finishing operations.

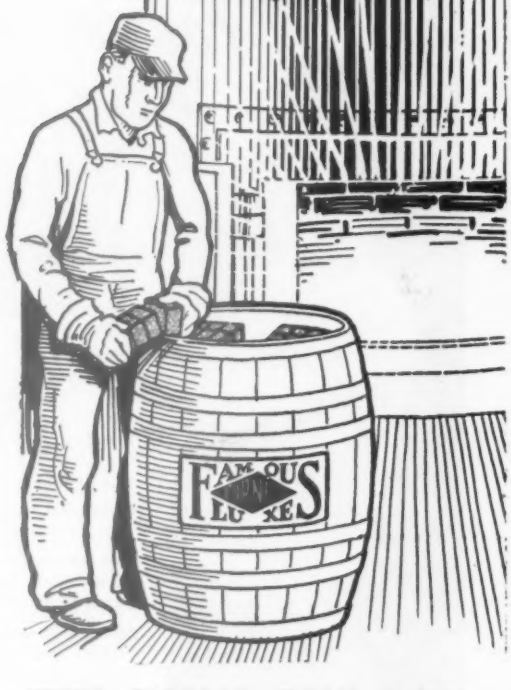

ERIE
"HOOK ON"
A widely accepted bucket for intermittent service in combination with a single drum overhead crane which is equipped with a hook block . . . Entirely controlled by the crane operator without extra attendance. Can be hand tripped - - - motor tripped - - - automatically tripped. Designed and constructed to prevent accidental dumping or other hazardous conditions. Built in a variety of models permitting the selection of a particular size, weight and type to insure the utmost performance in any specific application.
A Modern Production Bucket for the Foundry Industry
ERIE STEEL CONSTRUCTION COMPANY - ERIE, PA.
ERIE BUCKETS
10 TYPES TO MEET ANY BUCKET WORK

Whiting Establishes Scholarship

Whiting Corp., Harvey, Ill., has established a $25,000 scholarship fund at Illinois Institute of Technology, purpose of which is to help meet the postwar need for trained engineers. In announcing the fund, Stevens H. Hammond, executive vice president of Whiting Corp., said it was requested that the money be used in training worthwhile young men of both the full and part-time courses. A portion of the fund may go also to assist returning veterans.

AMAZING CASTING IMPROVEMENT with Famous CORNELL CUPOLA FLUX





• Costs but a *fraction of a cent* per average size casting!

By using Famous Cornell Cupola Flux many outstanding foundries have increased the production of dependably sound castings, and are avoiding costly make-overs, for a few cents per ton of metal.

Famous Cornell Cupola Flux shortens heats, makes iron hotter, more fluid, and its cleansing action causes rapid elimination of slag and other impurities.

Castings come sound. No dirt, hollow centers, nor chilled sides. They are stronger, denser grained, more capable of withstanding high pressure—and are more easily machined.

Famous Cornell Cupola Flux in its EXCLUSIVE SCORED BRICK FORM has these added advantages:

- Very convenient. Takes less than a minute to use, saving time and labor.
- Promotes accurate measurement—correct quantity of flux per charge. You simply toss in one brick to each ton or break off a briquette (quarter section) for each 500 pounds of iron in cupola.
- None of Famous Cornell Cupola Flux blows out with the blast. Being in brick form, it stays in melting zone until entirely consumed.

Write for Bulletin

The CLEVELAND FLUX *Company*

1026-1036 MAIN AVENUE, CLEVELAND 13, O.

Manufacturers of Iron, Brass and Aluminum Flux, Since 1918.

KEEPS CUPOLAS CLEAN, linings last longer.

Brick is protected in melting zone. Maintenance is reduced. And you always get a clean drop.

LADLES ARE CLEANER

This is further evidence of the purging and purifying action of the flux in the cupola.

FAMOUS CORNELL FLUXES
Trade Mark Registered

Write for Bulletins

Famous CORNELL ALUMINUM FLUX

Produces clean, tough castings. No spongy or porous spots even when more scrap is used. Thinner yet stronger sections are poured. Castings take a higher polish. NO FUMES! Exclusive formula prevents obnoxious gases. Metal does not cling to dross.

Famous CORNELL BRASS FLUX

Makes metal pure and clean, even when dirtiest brass turnings or sweepings are used. Produces castings which withstand high pressure tests and take a beautiful finish. Saves considerable tin and other expensive metals. Crucible and furnace linings are preserved.

Famous CORNELL LADLE FLUX

Place a few ounces in bottom of ladle, then tap cupola. Metal is thoroughly cleansed, foreign impurities are easily skimmed off. Ladles are kept clean, there is less patching and increased ladle life. Metal temperatures are retained during transfer to molds.

Foundrymen Meet In Montreal

(*Concluded from page 144*)

ing practice in ferrous and nonferrous metals. F. K. Vial, Griffin Wheel Co., Chicago, in introducing the subject of cupola practice stated that the cupola is the most efficient of all metal melting devices. Statistics compiled over a period of many years indicate that the crucible furnace is 3 per cent efficient, the air furnace 7 per cent, the open hearth 25 per cent, while the cupola shows an efficiency of 30 to 45 per cent. Approximately 20,000,000 tons of iron are melted annually in 5000 cupolas in the United States and Canada. Coke ratios vary from 7 to 1, to 15 to 1. Tapping temperatures range from 2550 to 2900 degrees Fahr. The speaker emphasized the need for more accurate controls. He described the hot blast cupola and stated that his company had saved a half million dollars by reduction in the amount of coke over a 10-year period.

He showed several slides illustrating relation between coke ratios, metal temperatures, melting rates, analysis of water, gases, etc. He expressed the belief that great savings can be effected through more careful control. A possible saving of $1 per ton would mean a saving of $20,000,000 per year to foundrymen of the United States and Canada.

A. C. Boak, consulting metallurgical engineer, Toronto, in discussing nonferrous melting practice, pointed out many features of operation capable of improvement. Especially he emphasized the importance of keeping detailed records. Under the head of good housekeeping he referred to the important feature of keeping metal of various compositions separated. For taking temperatures he advocated the use of the immersion type pyrometer. Summing up a discussion of all departments, melting, molding, coremaking and cleaning, he declared that many foundries are not operated as efficiently as they might be. He criticized the practice of selling castings by the pound.

C. E. Judson, Canadian Car & Foundry Co., discussed steel melting practice in acid and basic lined open-hearth furnaces. Of the four principal steps in the process, charging, melting, oxidizing and deoxidizing, he considered that the oxidizing stage is the most critical. Fluidity control of slags and metals came in for considerable attention in his presentation.

MADE OF ASBESTOS
For increased handling speed!
Because Transite Core Plates weigh so much less than metal, they are easily handled—thus speed production. Whether making castings of brass, aluminum, gray iron, malleable iron, or steel, here are some advantages Transite Core Plates provide:
Lightweight—Much lighter-than-metal, they handle easier . . . permit heavier loads.
Less Breakage—Fibrous asbestos-cement structure resists severe shocks, minimizes cracking and breaking.
Self-Cleaning—Both sides of Transite Core Plates are usable. While in the oven, core washes are burned off the underside.
Economical—Low initial price, inexpensive maintenance, long life . . . all lessen Transite Core Plate costs.
Low Warpage—Transite Core Plates have a low warpage tolerance. Less than 1/10 of 1%.
Corrosion-Resistant—Cannot corrode because they're made of asbestos-cement.
Perforated Plates—Transite Core Plates are available with perforations to eliminate green cores and reduce baking time.
For further details, write Johns-Manville, 22 E. 40th St., New York 16, N. Y.
JM
PRODUCTS
Johns-Manville
TRANSITE CORE PLATES

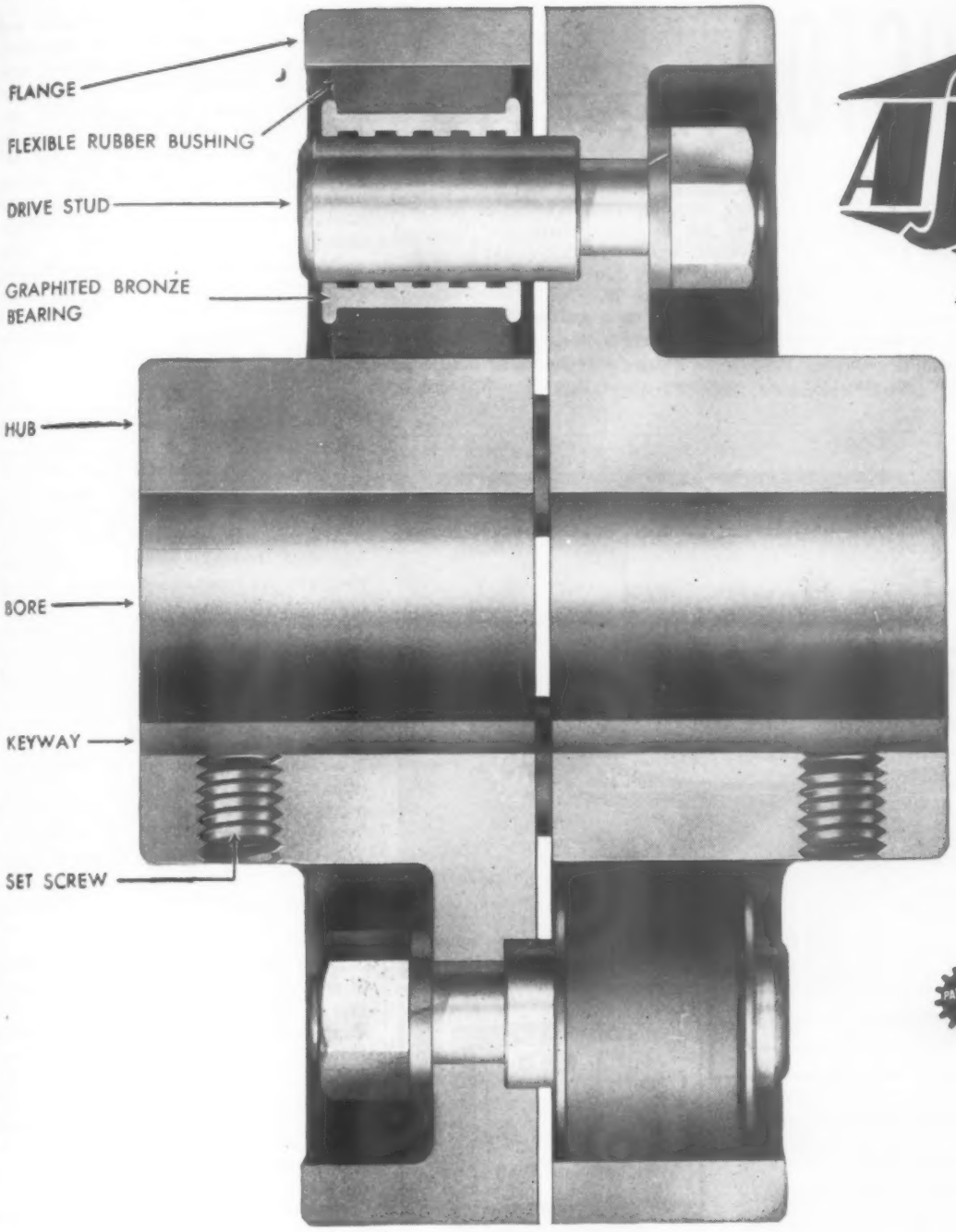
Returning Veterans Booklet Subject

Allis-Chalmers Mfg. Co., Milwaukee 1, has published a manual entitled "You and the Returning Veteran," addressed to foremen with reference to treatment of the veteran as he takes up his civilian life again. The purpose of the book is to aid supervisors by giving them information and practical suggestions on how to meet adjustment problems as they may arise. The book has been prepared by Allis-Chalmers with the assistance of the Wisconsin Society for Mental Hygiene. Copies are available to any interestetd group or employer.

Damping Capacity

British Non-Ferrous Metals Research Association, Euston street, London N.W.1, England, recently has published a research report entitled "Damping Capacity," by Prof. F. C. Thompson. The report contains 37 pages and constitutes a correlated survey of the present knowledge of the fundamentals of damping capacity, such as its metallurgical and mechanical significance, and the validity of the present methods of determining it. Suggestions are made as to directions in which future experimental work might prove fruitful. Copies of the report may be purchased from the association.

Mechanised Handling Plant & Machinery Ltd., 45 King street, Dunstable, Bedfordshire, England, has been appointed agent for the sale and distribution of Branford vibrators, manufactured by New Haven Vibrator Co., New Haven, Conn.



AJAX

Incorporated 1920

PATENTS MAKE JOBS

THE INSIDE STORY OF AJAX FLEXIBLE COUPLINGS

Ajax Flexible Couplings protect direct connected machines from unavoidable misalignment. They require no lubrication. They are quiet running — no backlash, no noise. They provide free end-float which permits electric machinery to find its magnetic center. They operate satisfactorily in abrasive-laden air.

They are built in a wide range of sizes and capacities with standard couplings *made of forged steel or cast semi-steel.*

For special requirements flanges can be machined from aluminum, bronze or other metals, and can be plated with chrome, silver or cadmium for protection against adverse atmospheric conditions. Thousands of cadmium-plated Ajax Couplings are running on U. S. Navy equipment throughout the world.

Ajax Couplings can easily be made integral with brake drums, pulleys, fly wheels, etc.

Write for new catalog giving complete data.

AJAX FLEXIBLE COUPLING CO. INC.

WESTFIELD, N. Y.

WASHINGTON *Notes* ★★★

INDUSTRY is encouraged by WPB's announced intention of dropping its control reins as fast as possible, so long as military requirements are met. Somebody, no doubt, will be caught short in the scramble for the gradually growing supply of materials available for civilian purposes, but WPB has taken the sensible attitude that if it attempted to see that every manufacturer, wholesaler and retailer got his exact share, the involved rules and regulations that would be necessary would bog down reconversion, rather than accelerate it.

★ ★ ★

To date, of course, the amount of many materials for reconverted industries is relatively small, but it will increase as military programs are adjusted and additional war contracts are cancelled. Meanwhile, various of the steps already taken by WPB will help to cushion the shock of contract terminations and cutbacks. Chief among these is the revocation of more than 200 "L" and "M" orders; unrestricted sale of steel, copper and aluminum where there is no interference with authorized CMP orders, and freeing of surplus stocks of these materials for unrestricted uses; granting of priorities for acquisition of bottleneck equipment for use in preparation for civilian production; and relaxation of controls over construction.

★ ★ ★

SMALL manufacturers, veterans and others wanting to establish new manufacturing enterprises will have some advantage in competing with larger companies for material. A new WPB regulation gives manufacturers who produce less than $50,000 worth of their own products per quarter a rating of AA-4 in obtaining materials. It also gives them the right to use a deferred CMP allotment symbol on orders for delivery of controlled materials (steel, copper and aluminum) after July 1.

★ ★ ★

In contrast to this special aid for the little fellow, the great bulk of new civilian production will be unrated and will not have the advantages of CMP allotments. The regulation does not apply to repair men, to the service trades, jobbers, wholesalers and retailers.

★ ★ ★

IN SOME respects the two-step ending of war production will cause less disruption of the economy than if all war needs stopped abruptly, as was the case in 1918. However, the fact that a one-front war still requires considerably more than 50 per cent of what military items we were producing before Germany collapsed means that, until VJ-Day or later, industry will face many problems in obtaining the numerous components and plant facilities it requires for what civilian goods output it is free to undertake.

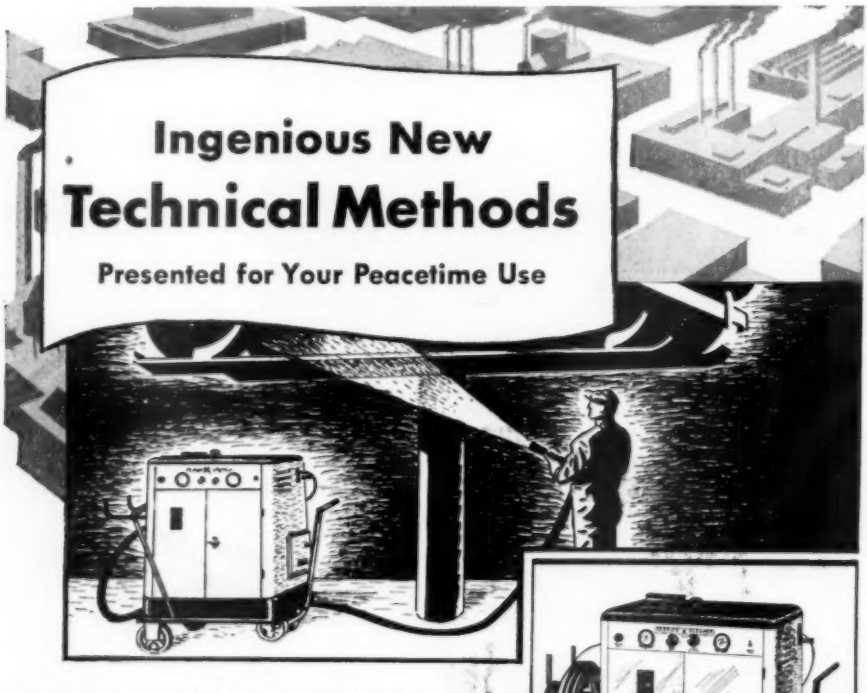
★ ★ ★

One question that is concerning not only some business men but also certain government officials, is whether the most effective use will be made of price controls so as to assist in reconversion. The point is made that if too much emphasis is placed on holding down prices of civilian goods the result will be to discourage production at a time when the emphasis should be placed on creating employment and bolstering the limited supply of such goods.

★ ★ ★

QUOTA restrictions on production of farm machinery have been removed, but some materials needed by the industry are short, including castings, chain, textiles, lumber and tires. As a result, production likely will not attain the volume that potential demand warrants. Value

(*Concluded on page 232*)



Coming to Users of Gas-Powered Equipment

80% SAVINGS IN CLEANING TIME

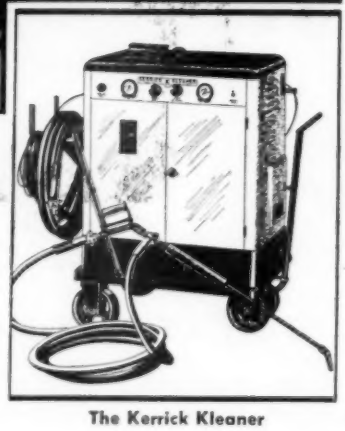
With Steam Rig Now the Army's Standby

An economical solution to the problem of cleaning and degreasing trucks, passenger cars, tractors, locomotives, excavators, and the like will be available to garages, service stations, all users of oil-burning equipment, as soon as war demands permit. It is a more efficient steam cleaner now in use by the thousands in the Armed Forces.

Neat "housekeeping" has too often been neglected by industry due to the costliness of hand labor. But the best housekeepers in the World, the U. S. Army, Navy and Marine Corps, dare not neglect frequent and thorough cleaning of all equipment to safeguard against fire and malfunctioning, and to permit fast, certain inspection. This cleaner, developed to meet their high standards, removes grease, dirt and grit 5 times as fast as any other method. It cleans by a balanced combination of heat, detergent, water and friction. It is typically "army" in simplicity of design and operation; in 30 minutes, the entire machine can be dismantled and completely cleaned.

Wartime uses of Wrigley's Spearmint Gum also point the way that industry may benefit when this quality product again becomes available. It will *again* be a "help on the job" in many ways. Right now *no* Wrigley's Spearmint is being made, as present conditions do not permit the manufacture of Wrigley's Spearmint in quantity and quality sufficient for all. But remember the Wrigley's Spearmint wrapper—it is a certificate of highest quality and flavor—and will always remain just that.

● *You can get complete information from Clayton Manufacturing Company, Alhambra, Calif.*



The Kerrick Kleaner

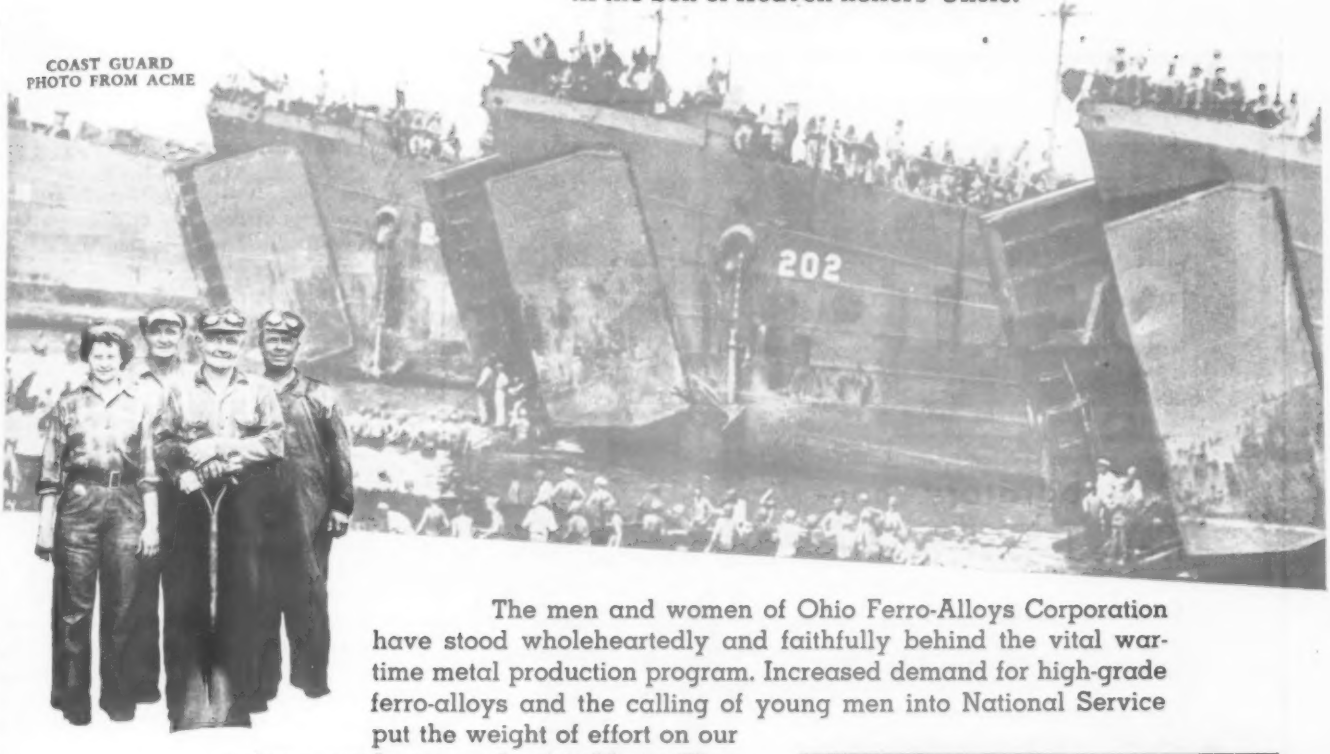
Remember this wrapper

Z-74

because we're part of it!

"We don't hit the island beaches, loaded down with what it takes to blast the Jappo. But back at the beginning of things, in the dusty unromantic job, we've stuck to our resolve to supply the ton on ton of needed ferro-alloys for the iron and steel makers. We've seen the ships, the tanks, the shining shell-cases . . . all better for our contribution. We're in it, we're part of it, and we'll be here 'til the Son of Heaven hollers 'Uncle!' "

COAST GUARD PHOTO FROM ACME



The men and women of Ohio Ferro-Alloys Corporation have stood wholeheartedly and faithfully behind the vital wartime metal production program. Increased demand for high-grade ferro-alloys and the calling of young men into National Service put the weight of effort on our veteran employees and untried but willing recruits. The record will attest their loyalty and strength.

With Victory and the steel industry conversion to manufacture of improved metals for civilian ends, we anticipate reemployment of our fighting men, expansion of our service staff, continued research, and production of ferro-alloys by improved techniques. Then, as always, practical operators can count on Ohio Ferro-Alloys for high metallurgical standards and intelligent advisory cooperation in solution of metal-making problems.

PHILO — DEPENDABILITY · QUALITY · SERVICE

RAINIER — DEPENDABILITY · QUALITY · SERVICE

© OFA 1935 © OFA 1941

FERRO SILICON 50%, 75%, 85%, 90%

H. C. FERRO CHROMIUM • FERRO MANGANESE

BOROSIL • SIMANAL

BRIQUETS

SILICON, MANGANESE, CHROME

Ohio Ferro-Alloys Corporation

Canton, Ohio

Chicago Detroit Pittsburgh San Francisco Tacoma

(*Concluded from page 230*)

of the industry's output in 1944 was nearly $470 million, approximately double that of 1943 and comparing with $355 million in 1940.

★ ★ ★

No early letdown in consumption of castings by the machine tool industry is in prospect, since existing backlogs will support shipments at the recent rate for about seven months and considerable new business is involved in prospective change-over from munitions to civilian goods production.

★ ★ ★

SCHEDULED cutbacks in munitions production are not spread evenly over the entire group. For instance, between April and the end of the year output of guns and fire control equipment is to taper 40 per cent, and ships 34 per cent. By contrast, dollar value of aircraft and aircraft engine production is to decline less than 1 per cent, with gains in such items as rockets, bombs, naval ammunition and mortar shells.

★ ★ ★

In components, as well as in basic materials, cutbacks will have an uneven effect. As an example, WPB studies indicate there will be substantial electric motor capacity for supplying reconverted industries, but the agency states that in the case of automotive-type gray iron castings, regularly programmed production exclusive of passenger automobiles will absorb the total production of presently operating foundries through 1945, even with allowance for some additional foundry manpower. Inference created by the latter statement appears exaggerated, since with potential automotive foundry capacity, gray iron castings hardly can be classed as a primary bottleneck in the resumption of passenger car production.

★ ★ ★

SURPLUS war property disposal has been proceeding recently at the rate of $40 million per month, but the inventories of surplus on hand are well over $1 billion, chiefly due to unsalable aircraft and related equipment. A huge job in this respect lies ahead; one estimate places the cost of surplus property resulting from this war as equal to one-third of the value of every man-made article which this country contained less than ten years ago.

★ ★ ★

Two surplus items of interest to the seafaring individual are 20,000 new cast steel ships' bells and 258 new manganese bronze propellers 18 to 48 inches in diameter, both items being offered by the U. S. Maritime Commission.

★ ★ ★

RESTRICTIONS on use of brass and bronze in the making of plumbing fixture fittings and trim have been removed. Formerly the use of castings containing any primary copper or tin and of higher grade than Alloy 5A was prohibited, except for military and certain other governmental orders.

★ ★ ★

Controls over production of aluminum cooking utensils, kitchenware and household articles also have been revoked. This move will facilitate increased production of aluminum ware whenever war contracts currently held by manufacturers are completed.

Shrinkage Problem

A 44-page brochure just published by the British Non-Ferrous Metals Research Association, Euston street, London N.W.1, England, is entitled "Shrinkage and Gas Effects in the Casting of Non-Ferrous Metals and Alloys," by W. A. Baker. Written in the light of recent researches by the association, it presents a connected account of shrinkage and gas phenomena during solidification of metals, with methods of eliminating ill effects on castings.

Book Review

Dictionary of Engineering and Machine Shop Terms, by A. H. Sandy, cloth, 153 pages, 5½ x 8½ inches, published by Chemical Publishing Co. Inc., Brooklyn, N. Y. Price $2.75.

This volume contains the definitions of numerous terms used in machine shops, industries and engineering literature. Language is simple and clear, and the book should be useful to engineers and students of engineering as well as to foremen and specialized workers in various shops and industries.

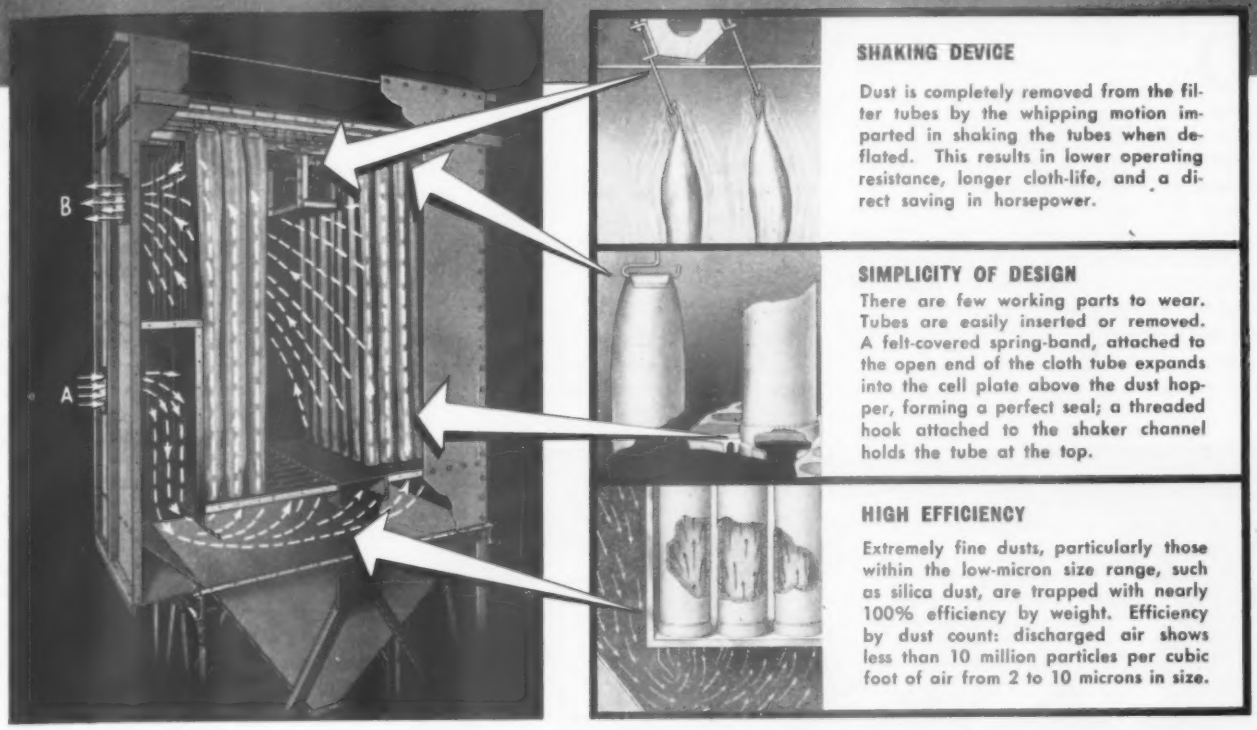
SCHUNDLER
BENTONITE

- A laboratory controlled, first quality product especially "tailored" for Foundry Use
- Offered by a pioneer producer

- Sold with a complete technical service . . . available on request . . . fitted to your individual needs
- Stocks located in principal cities

F. E. SCHUNDLER & CO., INC.
520 RAILROAD STREET • JOLIET, ILLINOIS
SCHUNDLER
BENTONITE

SIMPLICITY — Keynote of DUSTUBE Operating Efficiency



SHAKING DEVICE

Dust is completely removed from the filter tubes by the whipping motion imparted in shaking the tubes when deflated. This results in lower operating resistance, longer cloth-life, and a direct saving in horsepower.

SIMPLICITY OF DESIGN

There are few working parts to wear. Tubes are easily inserted or removed. A felt-covered spring-band, attached to the open end of the cloth tube expands into the cell plate above the dust hopper, forming a perfect seal; a threaded hook attached to the shaker channel holds the tube at the top.

HIGH EFFICIENCY

Extremely fine dusts, particularly those within the low-micron size range, such as silica dust, are trapped with nearly 100% efficiency by weight. Efficiency by dust count: discharged air shows less than 10 million particles per cubic foot of air from 2 to 10 microns in size.

The High Efficiency and Simplicity of Dustube operation is a difficult combination to equal for top performance and low operating costs.

Here are but a few of the design features responsible for Dustube's popularity among America's top-ranking foundries:

No tools are necessary to install the filter tubes in a Dustube collector. One man can do the job very quickly. The bottom of the tube is simply inserted in the cell plate and the top is hung on a hook attached to the shaker channel.

Tubes—being compact and light—are easy to store, economical to ship, and do not burden the collector with excess weight.

Tubes are *never* under tension, thus eliminating enlargement of the cloth pores and weakening of the fabric due to stretching. There are no vibratory metal wires to abrade or corrode the cloth. Only very fine float dust can ever reach the tubes—*never* the coarse cloth-wearing particles that are allowed to by-pass in some systems. Clogging of tubes is prevented because they have a 5" opening throughout and are deflated when shaken.

Ample spacing of tubes saves power by decreasing resistance to air flow, and provides more uniform air velocity throughout the collector.

Tubes are shaken like a rug while deflated and limp, effectively releasing all accumulated dust. Dust does not precipitate onto other tiers of dust cells, but falls immediately into the storage hopper. This reduces cloth wear, reduces shaking time, and provides a more perfect cleaning of the filter tubes.

It is not necessary to disassemble any part of the collector to determine the condition of the tubes . . . the operator can view every tube from a central walkway.

Dustubes are designed and built in capacities ranging upward from 270 C.F.M. for all foundry dust-creating operations. Write us today about any dust problems that may be troubling you, and ask for Booklet 112, "Dust—Silent Saboteur of Production".

American
FOUNDRY EQUIPMENT CO.
505 SOUTH BYRKIT ST. MISHAWAKA, IND.

dustube
DUST COLLECTORS

Industry BRIEFS

DAYTON-DOWD CO., Quincy, Ill., pump manufacturer, has been purchased by the Food Machinery Corp. and made a branch of the latter's Peerless Pump Division, Los Angeles. The Quincy plant will be continued as Peerless Pump Division Inc. Henry F. Dayton, recently president of Dayton-Dowd, has retired, but William C. Dowd continues as executive in charge of engineering. Rome A. Terwelp and Carl N. Adams remain as factory manager and assistant manager in charge of the office, respectively. Clarence M. Frazier, vice president of Food Machinery Corp., is supervising all Peerless Pump branches, with Henry J. McKenzie, formerly Mr. Frazier's assistant, the new manager at Quincy.

° ° °

Cincinnati Foundry Co., Cincinnati, O., announces the retirement of James B. Schumacher from the partnership, effective May 28. George A. Euskirchen will continue the business under the firm name.

° ° °

Richmond Radiator Co., Uniontown, Pa., has purchased the sanitary ware plant of the General Ceramics Co., Metuchen, N. J., which has been operating under the name of Carillon Ceramics Corp. Extensive improvements and additions will be made as quickly as lifting of wartime construction restrictions will permit, when a complete line of plumbing fixtures will be offered. Richmond Radiator Co. is a subsidiary of the Reynolds Metals Co., Louisville, Ky.

° ° °

Machine tool shipments during April were valued at $40,331,000, about the same as in March, while unfilled orders decreased to $287,920,000, or 7 per cent from March, according to WPB. At the current rate of shipment, it is estimated it will take the industry 7 months to catch up with orders on hand as of the end of April. Value of new orders received decreased $30,011,000, or 63 per cent, as compared with March.

° ° °

Pangborn Corp., Hagerstown, Md., has been granted a third renewal of the Army-Navy "E" Award in recognition of meritorious service and continued production achievement in the manufacture of blast cleaning and dust control equipment. The company also flies the United States Treasury "T" flag and the National Safety Award emblem beneath the Army-Navy "E" pennant.

° ° °

Foundry equipment orders declined sharply in April to 325 per cent of the 1937-38-39 monthly average, according to the Foundry Equipment Manufacturers Association. This compares with 604.7 per cent in March and 385.7 a year ago. Sales of repair parts continued near the wartime peak, most of the April slump occurring in orders for new equipment.

° ° °

The Herbick Co. is the firm name under which James H. Hitch, Berkeley, Calif., has published a certificate that he is conducting a foundry and industrial supplies business at 322 Madison avenue, Pomona, Calif.

° ° °

For continued production achievement in the manufacture of essential cast and forged steel valves, the Edward Valve & Mfg. Co. Inc., East Chicago, Ind., has been awarded its fifth gold star by the United States Maritime Commission.

° ° °

Southwest Foundries, 1254 West Rosecrans avenue, Clearwater District, Los Angeles, Calif., plans an addition to its foundry building, at a cost of $1200.

° ° °

Building permit has been issued for construction of a brick foundry building at 16,517 Manhattan place, Gardena, Calif., for A. Ramsdale, covering an area of 22 x 70 feet, to cost $1500.

° ° °

Production of truck trailers during the first quarter totaled 39,305 military type and 7263 civilian type, according to WPB.

° ° °

Vilter Mfg. Co., Milwaukee, manufacturer of refrigeration equipment, has been sold to Foundation Inc., Milwaukee, a non-profit corporation. E. B. Tilton,

(*Concluded on page 236*)

FOUNDRY WINS "E": *Thos S. Hemenway (right), president, Metal & Alloy Specialties Co. Inc., Buffalo, holds the Army-Navy "E" flag awarded the company and its employes at plant ceremonies May 15. Also shown, left to right, are: Rear Adm. W. T. Cluverius, USN (retired), the principal speaker; Lt. Col. John F. A. Bierne, who presented the "E" emblems, and Lt. Cmdr. John T. Casey, USNR, the master of ceremonies. John K. Michalski, the company's oldest employe in point of service, represented the employes in accepting the "E" pins*

Exceptional HEAT UNIFORMITY

...with MAEHLER ovens...

. . . mean more uniformly baked cores

RECENT TESTS SHOW . . . temperature variations of only 5°

93.6%
OF MAEHLER'S PRODUCTION
IS DEVOTED TO REPEAT ORDERS!

..... There is no better proof of the superiority of Maehler ovens and furnaces.

MAEHLER'S leadership in developing the recirculating air heat system for industrial ovens has resulted in a line of equipment that gives heat uniformity that is virtually *perfect!* Recent tests show that a Maehler oven operating at 500°F fully loaded maintained a heat uniformity within 5°, through high volume and rapid air heat circulation and highest grade instruments. This kind of temperature control means uniform baking . . . no under-baked nor over-baked cores.

Maehler core and mold ovens are available in a complete range of oil fired, gas fired and electrically heated units, incorporating the Maehler recirculating principle for high uniformity and output, at low cost.

Let us quote you on your requirements.

THE PAUL MAEHLER COMPANY
2200 W. Lake Street • Chicago 22, Ill.

A Few Users of
MAEHLER EQUIPMENT
AMERICAN BRAKESHOE & FOUNDRY
GREENLEE BROS.
PACKARD MOTOR CAR CO.
EBALOY FOUNDRIES
BOHN ALUMINUM & BRASS CORP.
GENERAL MOTORS CORP.
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MAEHLER

Industrial Ovens and Furnaces for Core Baking, Mold Drying, Heat Treating, Enameling, etc.

Consulting Service

with particular reference to

METAL MAKING

and

FOUNDRY OPERATING PROBLEMS

STEEL • MALLEABLE
GRAY IRON
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W. HARVEY PAYNE & CO.

PRACTICAL FOUNDRY ENGINEERS

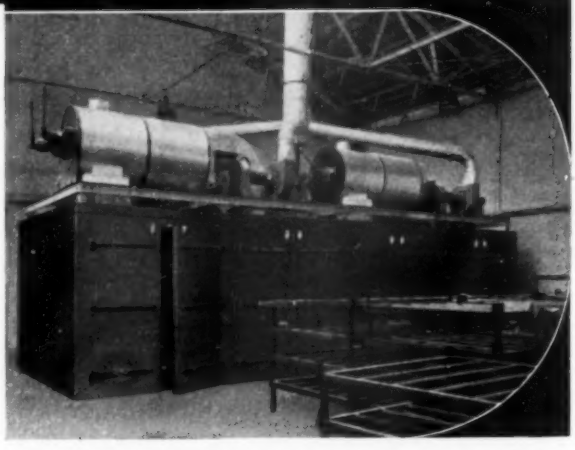
4040 BOARD OF TRADE BLDG. — PHONE WABASH 3550
141 WEST JACKSON BLVD. • CHICAGO (4), ILL.

New FOUNDRY OVENS

REMODELING

AND

REPAIRS?



Reconversion to normal production will entail many changes.

In foundries it may require the repair of overworked ovens—the redesign of outdated equipment—the rearrangement of core and mold ovens—or their removal to new locations.

Lanly is in a position to render expert assistance in any service pertaining to ovens or furnaces for industrial uses.

Write for illustrated catalogs and consult us regarding any need that may arise.

THE LANLY CO.
OVENS FOR INDUSTRY
HEATED BY GAS, OIL, ELECTRICITY OR STEAM
750 PROSPECT AVENUE • CLEVELAND, OHIO

(*Concluded from page* 234)

formerly executive vice president, general manager and treasurer, has been named president of the Vilter Mfg. Co. and president and a member of the board of directors of Foundation Inc.

• • •

Zelis-Howell Foundry Inc. has been organized in Los Angeles, with 2500 shares of no-par value capital stock. Directors are Christopher L. Zelis, Harry D. Howell Jr. and George L. Walker. The company is represented by Hansen & Sweeny, Title Insurance Bldg., Los Angeles.

• • •

Modern Pattern & Foundry Co., Vernon, Calif., has begun construction of a temporary wood frame and corrugated iron structure 50 x 100 feet, to cost $4000, which will replace its plant recently destroyed by fire at an estimated loss of $200,000.

• • •

Cooper-Bessemer Corp., Mount Vernon, O., has been granted a second renewal of the Army-Navy "E" award in recognition of outstanding production of diesel engines at its Grove City, Pa. plant.

• • •

Building permit has been issued for construction of a new factory building at the plant of O'Keefe & Merritt Co., stove manufacturer, at 3700 East Olympic boulevard, Los Angeles, to cost $45,000.

• • •

Kunkle Valve Co., 121 South Clinton street, Ft. Wayne, Ind., plans construction of two foundry buildings, 200 x 500 and 30 x 140 feet, on an 8½-acre site west of Winter street.

• • •

National Bearing Metals Corp., St. Louis, has let contract for a one-story 83 x 95-foot addition to foundry and machine shop.

• • •

Permit has been granted for construction of an addition to the foundry building of Capitol Brass Foundry, 1822 East 58th place, Florence District, Los Angeles.

• • •

Building permit has been issued for construction of an addition to the foundry building of the Ace Foundry, 8240 South Marbrisa street, Florence District, Los Angeles, to cover an area of 28 x 35 feet and to cost $6000.

• • •

Somers Foundry Co., Bellevue, Ill., is now known as the General Magnesium Foundries Co., 612 South Third street, Belleville.

• • •

Belle City Malleable Iron Co., Racine, Wis., has let contract to Nelson & Co., Inc., 1550 Yant street, for an 88 x 120 foot pattern storage building. E. A. Klinger is architect.

• • •

Olympic Foundry Co., 5012 Airport Way, Seattle, plans construction of a pattern storage building 35 x 100 feet.

• • •

Stoker production in the first quarter totaled 16,991 units, including 633 domestic type and 10,659 industrial type, according to WPB.

Industrial LOGISTICS

Modern Science of Materials Movement to Increase Profits by Reducing Costs

YOUR selling price is the sum of scores of individual costs, plus fair profit. Can those costs be reduced still more—either to improve net earnings or to give customers a *better* price?

Elwell-Parker has answered that question, *with proof,* for Executives in more than 300 branches of peacetime industry. The proof is supplied through Industrial Logistics—a phrase coined by Elwell-Parker to describe the science of eliminating waste motions throughout the handling of materials, in Master Unit Loads.

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The Elwell-Parker
Electric Co.

"Industrial Logistics" is a new term, but the economy-principles it incorporates are long-established—applied through the daily operation of thousands of Elwell-Parker Industrial Trucks and Cranes.

Industrial Logistics challenges Management to maintain the maximum flow of peacetime products through every stage of manufacturing, warehousing and distribution to the greatest number of customers, by means of a thoroughly-coordinated Plan. Thus Industrial Logistics is closely related to the placement of returning servicemen; the creation of more jobs; the control of costs and the broadening of markets.

To demonstrate the worth of Industrial Logistics in your business, Elwell-Parker will send an experienced Regional Field Engineer to help you to ferret out wastes in your present load-handling operations —and to show how they can be corrected with Elwell-Parker Truck and Crane Systems, properly installed. Executive inquiries are invited.

The Elwell-Parker Electric Company, 4220 St. Clair Ave., Cleveland 14, Ohio.

ELWELL-PARKER

POWER INDUSTRIAL TRUCKS

Established 1893

Modern Design...
MEANS FUTURE ECONOMY!

The modernity of design and layout in your plant or plant expansion project will definitely be a determining factor in the success of your enterprise. The A. A. WICKLAND & Co. has devoted nearly a quarter-century to the solving of the many and varied problems associated with design, construction and operation of modern foundries. Our highly trained staff of engineers is always at your service and will be happy to assist you with any design or construction problems you may encounter. Write or telephone us today!

FOUNDRY ENGINEERS SINCE 1919

A. A. WICKLAND & CO.

ENGINEERING BUILDING • CHICAGO (5)

TELEPHONE DEARBORN 9344

ESTABLISHED 1905 — **Strand** FLEXIBLE SHAFTS — FORTIETH YEAR 1945

HIGH QUALITY

FLEXIBLE SHAFT MACHINES

ONE HUNDRED TWENTY-FIVE TYPES AND SIZES, ⅛ TO 3 H. P.

HORIZONTAL AND VERTICAL

THREE SPEEDS OR SINGLE SPEED

MORE THAN THREE HUNDRED ATTACHMENTS.

•

SEND FOR CATALOG NO. 29

THE LARGEST LINE IN THE WORLD

•

N. A. STRAND AND COMPANY

5001-5009 NO. WOLCOTT AVE. — CHICAGO 40, ILL

FIRST AID FACILITIES GROW WITH COMPANY

(*Continued from page* 103)

first aid to injured employes. He remarked that his treatment of many arm and leg injuries consisted of soaking the member first in a pail of hot water then in one of cold water—"we always kept a pail of hot water on hand for this purpose," he said.

The opening of these new quarters was celebrated early this year with an inspection by the outgoing safety committee, the incoming safety committee, the officers of the company and invited guests from the claim and engineering departments of the Workmen's Compensation Insurance carrier. Following inspection of the premises, a dinner was served at a local hotel. Brief talks were given by each of the guests, officers, doctors, and personnel from American Mutual Liability Insurance Co., which carries the company's workmen's compensation coverage.

Then the regular shop safety meeting was held, giving the guests a practical demonstration of how the committee operates and handles the problems which have arisen during the past month. The nurse is the secretary of the committee and participates actively in the discussions. The sincerity and earnestness expressed by the members of the committee in their discussion were always in evidence.

Maintain Sincere Attitude

It was brought out in comment made by workmen's compensation insurance executives present that this attitude of sincerity toward accident prevention carried over to employes so that when dealing with them, insurance personnel always found them to be reasonable and willing to carry out instructions, and never discovered them soldiering when they were injured.

Following the safety meeting, two short slide film shows were given.

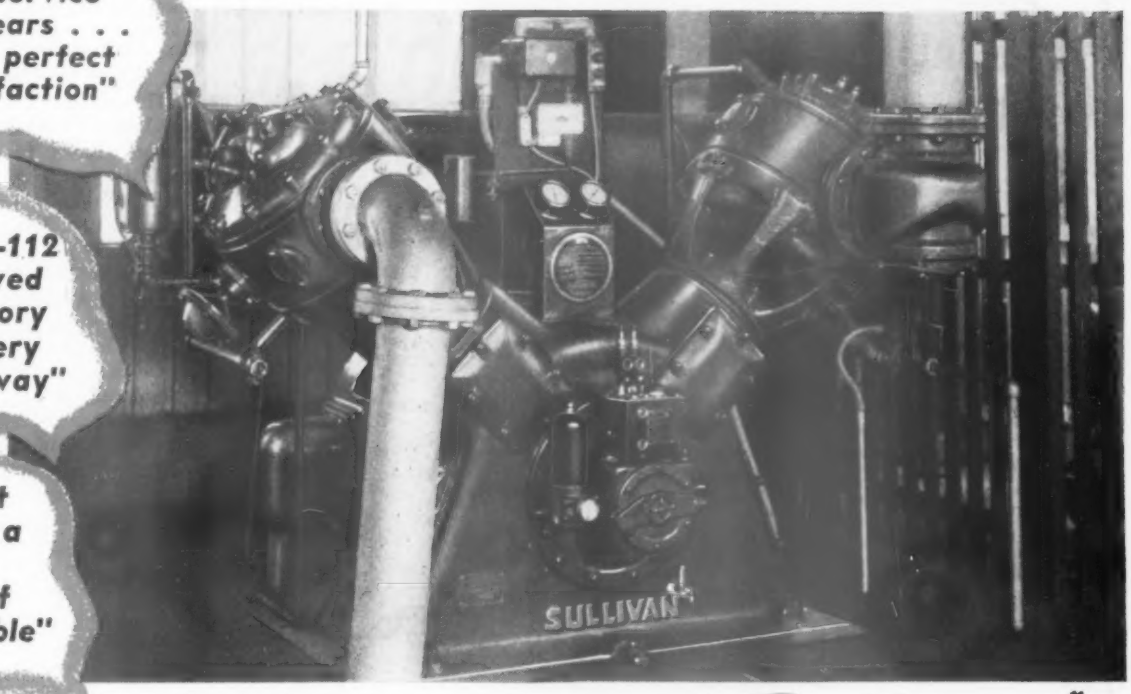
Among the important duties of the nurse is the keeping of daily records of injuries from which she makes up her weekly reports of all new accident cases. These reports, such as in Fig. 5, are sent to the president and another copy goes to the superintendent of the plant, who also has the title of safety director. Incidentally, it is of interest that there is a permanent safety committee comprised of the president of the company, the superintendent of the plant, the superintendent of maintenance, and the nurse. Members of the temporary committee, which is appointed for six months, are representatives of each of five operating departments. These members are selected by the superintendent and consist of foremen rotated to cover all of the plant activities.

(*Concluded on page* 240)

"In service ten years . . . with perfect satisfaction"

"Our WN-112 has proved satisfactory in every way"

"has not given us a particle of trouble"

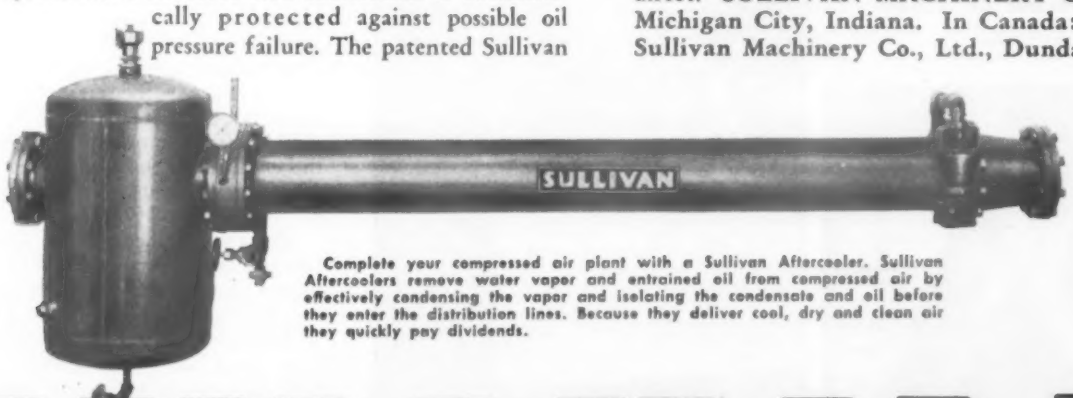


"We're glad we selected Sullivan"

These are typical comments from manufacturers all over the country. Years from now they will still be glad they installed this Sullivan heavy-duty, two stage WN-112 air compressor because it will still be providing quiet, efficient, heavy-duty service twenty-four hours a day with a minimum amount of attention.

The superior design of Series 100 air compressors, a design that was pioneered by Sullivan more than ten years ago, eliminates the need for adjustments characteristic of ordinary compressors. The precision cross-head and connecting rod bearings never require adjustment. Full force-feed lubrication is automatically protected against possible oil pressure failure. The patented Sullivan "Dual-Cushion" valve is free-acting, coming to rest smoothly and quietly at the top of the lift . . . *and on its seat*. There's no pounding action to shorten valve life or cause valve noise. When compressor wear eventually occurs, "new machine efficiency" can be easily, quickly and economically regained by replacing cylinder and cross-head liners.

Sullivan Series 100 air compressors are offered in single or twin units with piston-displacement capacities from 378 to 3656 C.F.M., at pressures up to 125 p.s.i. Ask your nearby Sullivan representative for a copy of Bulletin A-52 which contains full details, or write direct. **SULLIVAN MACHINERY COMPANY, Michigan City, Indiana. In Canada: Canadian Sullivan Machinery Co., Ltd., Dundas, Ont.**



Complete your compressed air plant with a Sullivan Aftercooler. Sullivan Aftercoolers remove water vapor and entrained oil from compressed air by effectively condensing the vapor and isolating the condensate and oil before they enter the distribution lines. Because they deliver cool, dry and clean air they quickly pay dividends.

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PRODUCTS

Stationary and Portable Air Compressors from ¼ to 3,000 H.P., Pneumatic Casting Grips, Foundation Breakers, Portable Hoists, Rock Drills.

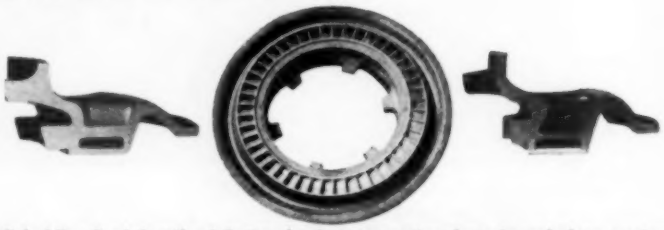
QUALITY • DEPENDABILITY
UNIFORMITY • PRODUCTION
...Vital in the Casting of Metals

FOUNDRY SPECIALISTS

A highly skilled staff of Foundrymen . . Engineers . . Metallurgists

SPECIALISTS IN:

- Methods for Improving Production and Decreasing Costs
- Metallurgical Control and Standardization
- Mechanization and Modernization
- Scientific Foundry Management
- Manufacture of Centrifugal Castings

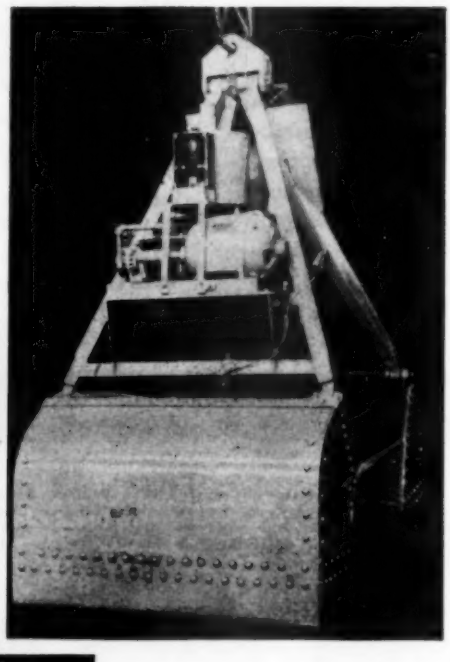


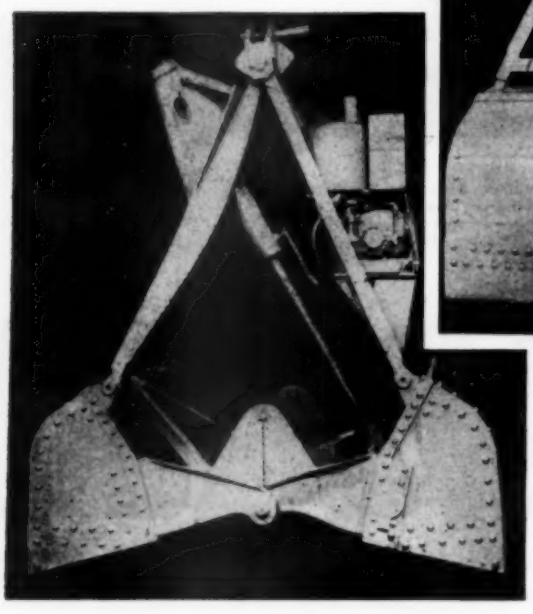
High Alloy Steel Centrifugal Casting showing cross sections formerly made from a series of forgings. Thin section 1/16-inch—100 per cent X-Ray Inspection.

W. G. REICHERT ENGINEERING CO.
1060 Broad Street —*Foundry Specialists*— Newark 2, N. J.

NEW HYDRO-ELECTRIC BUCKET
BY
BROWNING

This is a new hook-on fast operating electric bucket. Can be made to operate on either A.C. or D.C. The bucket operates on a new patented principle.





VICTOR R. BROWNING COMPANY, INC.
WILLOUGHBY, O.

★

(*Concluded from page* 238)

As could be expected, the record of accident frequency and severity has been increasingly favorable. The index of accident frequency for 1941 was 105.5, for 1942 it was 151.8 and for 1943 it was 78. The accident severity index for 1941 was 76.5, for 1942 it was 50.1 and for 1943 it was 38.6. The lost time frequency index for 1941 was 26.4, for 1942 it was 21.5 and for 1943 it was 18.3. Calendar days lost from production for 1941 totaled 725 days, for 1942 there were 396 days lost and for 1943 there were 316 days lost.

There has been a steady decline in the loss ratio of this manufacturer and for the last six months the trend in each of the foregoing classifications has declined further.

The results in dollars of the progressive attitude of the management of this plant toward accident prevention and first aid is apparent from the following figures showing percentage of charge and credit of the experience rating for figuring the amount of the Workmen's Compensation Insurance premium:

1941—a charge of 12 per cent
1942—A charge of 11.6 per cent
1943—A charge of 8.1 per cent
1944—A credit of 1.5 per cent

This amounted to approximately $1000 saved in the premium for workmen's compensation in 1944.

THERE WERE SKILLED MEN IN THOSE DAYS

(*Continued from page* 101)

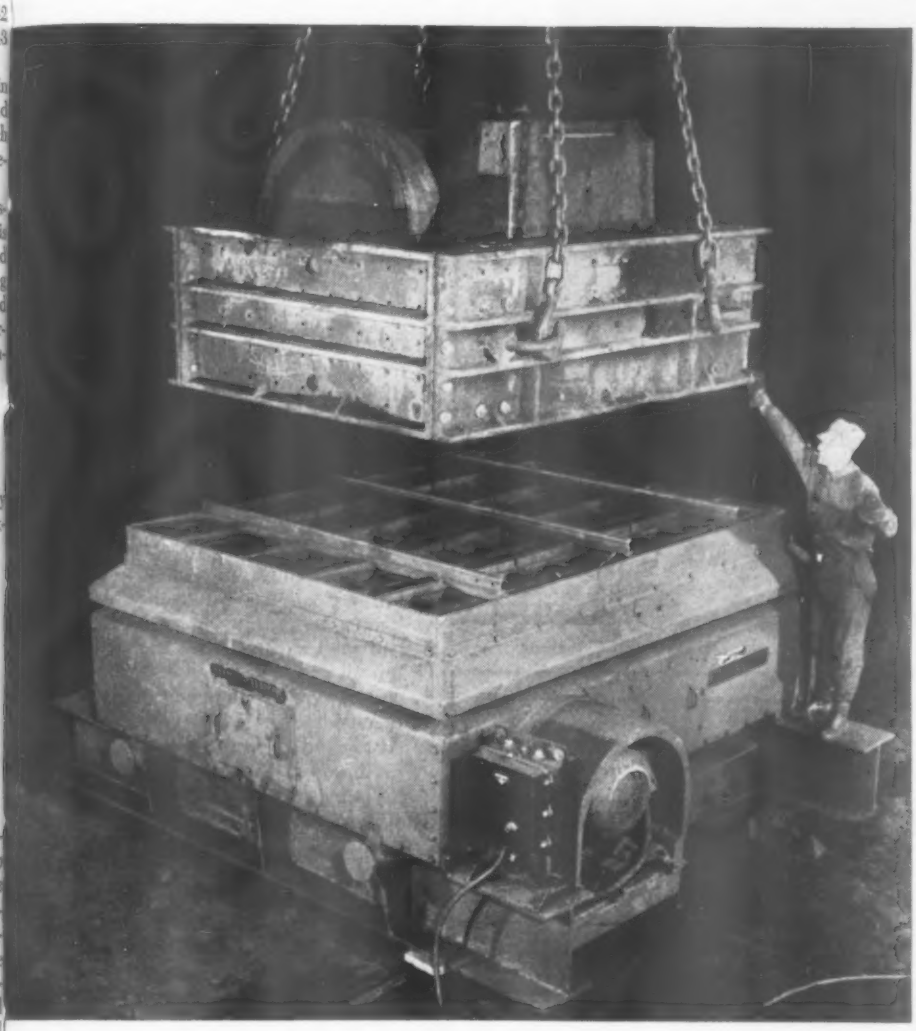
weird bird and animal group nomenclature—including a *sloth of bears*, a *whisp of snipe*, a *gam of whales*, and a *gaggle of geese*—the correct term for a number of lions in more or less close formation is a *pride of lions*. The Young pride includes six life-size specimens, all exactly alike. And the reason they are all exactly alike is because they were all cast from the same pattern. Two of the noble beasts, one on each side, guard the entrance to the front door, while the others recline gracefully at various points on the lawn.

Mr. Young inherited the lions from a pioneering farmer grandfather who acquired them in settlement of a debt. This sturdy yeoman chopped down the trees and plowed the land at a period when every man had to stand on his own two feet and conduct himself according to the dictates of his conscience. He paid his debts and held to the belief that others should do likewise. Adherence to this principle led to his acquisition of the cast iron lions.

The family legend, which we are in position to neither confirm nor deny, sets forth that on or about the year 1872 the farmer cut and threshed a field of wheat. Among other customers he delivered a

(*Continued on page* 242)

ANNOUNCES GIANT NEW SHAKEOUT TO HANDLE 90% OF TONNAGE CAST IN AVERAGE U.S. JOBBING FOUNDRY



Casting, flask and sand weighing 13½ tons are lowered onto a new 25 ton capacity "Foundromatic" Shakeout. One minute and 45 seconds later the casting is removed — free of sand! Secret of new big capacity is two-bearing construction, in which capacity is determined largely by size and number of support springs. Get full details in Bulletin B6365. And plan, at your earliest convenience, to *see* the new "Foundromatic" Shakeout in operation at Milwaukee. Make arrangements through our nearby district office or directly with ALLIS-CHALMERS, MILWAUKEE.

Single Unit Shakes Out 500 To 50,000 Pound Molds

MILWAUKEE, WIS. — Allis-Chalmers announces two new "Foundromatic" Shakeouts — world's most heavily constructed units for this service.

The larger, 25 ton capacity shakeout is designed to handle 90% of the tonnage cast in the average jobbing foundry — where molds in a typical day range anywhere from 500 to 50,000 pounds each.

A single unit, the new shakeout eliminates need for using 2 to 4 smaller conventional four-bearing shakeouts in multiple arrangement to get big capacity. In addition, it offers these advantages: Lower initial and operating cost; Less maintenance; and Valuable savings in floor space.

"Foundromatic" Shakeouts are now available in 6 by 8 and 8 by 10 foot sizes, 15 and 25 ton capacities respectively. Complete details given in Bulletin B6365.

Extra Melts Per Day

One or more extra melts per day — at lower cost — can be had when arc furnaces are served by Allis-Chalmers complete substations. Revolutionary "Regulex" electrode control is largely responsible for these gains.

This kind of help is typical of A-C equipment for the foundry industry — Vibrating Screens, Crushers, Feeders, Hearth Furnaces, Kilns, Coolers, Dryers, A-C and D-C Motors, Starters, Texrope Drives, Centrifugal Pumps, Cupola Blowers, Air Compressors, Vacuum Pumps, Furnace Transformers, etc.

A 1868

ALLIS CHALMERS

CONCO CRANES FOR FOUNDRIES

The ideal foundry crane—compact, strong, easily and quickly operated. Throughout the country foundries large and small—having important war contracts—are using this Conco Low-Headroom-High Hook Lift Crane. With many outstanding construction features, it is designed to meet the needs of today. Write us for complete information.

CONCO ENGINEERING WORKS
DIVISION OF H. D. CONKEY AND COMPANY
19 GROVE STREET — MENDOTA, ILLINOIS

Consulting Engineer
30 YEARS EXPERIENCE
in
GREY IRON FOUNDRIES

Metal Mixtures
Gates—Risers
Operating Economy
Blueprint Estimates
Pattern Construction

L. V. TUTTLE

CASWELL BLDG. • PHONE MARQUETTE 0622
152 W. WISCONSIN AVE. • MILWAUKEE 3, WIS.

(*Continued from page* 240)

four-horse-team load to the owner of a foundry in Massillon. The foundryman either would not or could not pay for the wheat. The legend conveniently skips this feature as of no particular interest. When polite request, more heated protest and a final barrage of distinctly uncomplimentary biological data failed to bring results, the farmer angrily stalked out of the foundry office and bent his steps in the direction of the nearest tavern, a low place of entertainment and refreshment for man and beast. Adequately entertained and refreshed, pulses racing, blood pressure and temperature close to the boiling point, and with increased faith, if possible, in the justice of his claim, he returned to the foundry and loudly proclaimed to one and all that he would have his money—or else.

By the law of averages and one thing and another it is reasonable to assume that the foundryman was accustomed to the sound of strong language. It went in one ear, as the saying goes, and out through his left elbow. With his few remaining teeth he gnawed off a fresh chew of tobacco, indulged in a preliminary spit, shrugged his shoulders and said "So, what?" or whatever equivalent bright and snappy remark was current among the wits of the early 70's.

He Grabbed the Lions

Just to show him what was what, the farmer and his hired man laid violent hands on half a dozen cast iron lions and loaded them into the cart. Then to top off the load he added a flock of little cast iron negro boy horse holders. The legend does not state whether he intended to hold them as hostages or collateral or intended to sell them. In any event he never disposed of them and they were still gathering dust and cobwebs in the barn when the old boy finally checked in at the gate at the end of the road.

Allowing for the additions, subtractions, lapses and stray features that are bound to creep into a legend over 70 years old, one may accept the story in its entirety with possibly one minor item. Although the actual weights are not available, a conservative estimate of the cart load of castings would be approximately 10 tons. We wonder if we are laying ourselves open to a demerit mark on our report card when we admit that we find it difficult to believe that any four-horse team could pull a 10-ton load up hill for several miles on a muddy crooked and unpaved country road. What's that? Ah, yes. Quite true. Quite true. As little Johnnie Bright eyes in the front row very pertinently points out, "What's ta stop de old guy from making two trips?"

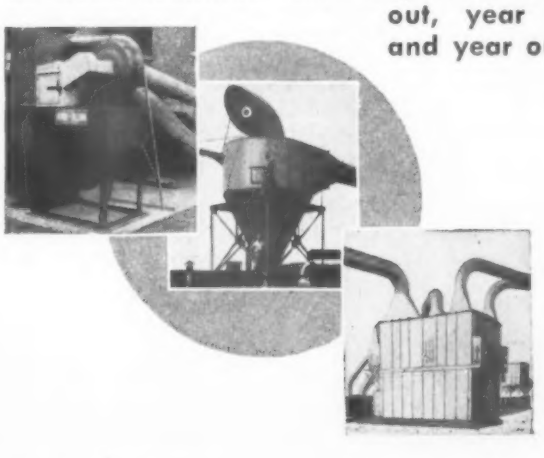
Since direct evidence is not available we can only speculate on the method probably employed in the production of the castings. Three main alternative methods may be considered, with one or two minor variations in each. The first is known as the *cire perdu* or lost wax method. In this method the sculptor

(*Continued on page* 244)

MAKE A *Clean Sweep* OF *Destructive* DUST!

Dust and fumes are insidious, deadly enemies of production efficiency. They can wreak havoc on workers' health . . . lower productive output . . . impair valuable machinery and equipment.

For 38 years, Kirk & Blum has been waging a successful war against these twin foes of modern industrial efficiency. Control systems installed by Kirk & Blum conquer dust and fumes—and remove them in a "clean sweep" that leaves plant air clear, healthful, safe—day in and day out, year in and year out.



The basic reason for this superior performance lies in the long-experienced "know-how" and scientific approach of K & B Air Engineers. Requirements of the individual plant are first thoroughly, expertly analyzed. Then—and only then— a complete dust or fume control system is planned, designed and installed to meet those *particular plant requirements.*

Let the professional experience of K&B Air Engineers be *your* guide to lasting satisfaction in this highly technical field—just as it has been for other industrial plants the nation over. For details, write THE KIRK & BLUM MFG. CO., 2808 Spring Grove Ave., Cincinnati 25, Ohio.

Send for Booklets

Dust Control Systems in Metal Industries
Fan Systems for Various Industries
Blower Systems for Woodworking Plants
Cooling Systems for the Glass Industry
Industrial Ovens
Data on Kirk & Blum Production Facilities

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For Casting
sand
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For Deoxidizing
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Consult us on your Aluminum needs

THE CLEVELAND ELECTRO METALS CO.
CLEVELAND 13, OHIO

MEMBER — ALUMINUM RESEARCH INSTITUTE

Expands as it dries!

QUICK DRYING

SHELTON METALLIC FILLER

HARD SETTING

A metallic cement that expands as it dries making a permanent surface patch on iron and steel castings. Proved best in 25 years of foundry service. Dark and light shades in one to 100 lb. containers. Free sample on request. *Manufactured by*

AMERICAN CRUCIBLE COMPANY
SHELTON, CONN.

(*Continued from page* 242)

fashions a clay figure of the object. This is covered with plaster, either in one continuous unit, or in sections, depending on conditions. After the plaster has set, the clay model is dug out. The face of the mold is cleaned and covered with sheets of wax corresponding in thickness to the desired thickness of metal in the casting. Small molds are filled with molten wax which commences to solidify in contact with the cold mold face. When the shell has solidified to the required thickness the mold is inverted and the surplus wax, still in a fluid state is spilled out. The inside of the wax pattern is filled with plaster reinforced with any necessary rods or arbors. The mold is raised to a high temperature, either in an oven, or by other means, and the wax is melted out. The cavity then is filled with metal.

In a variation of this method, where a number of duplicate castings are required, the original plaster is made in several sections keyed together. After the wax has solidified, the plaster sections are removed and replaced by the permanent coating as in the first instance. The master mold is assembled and taken apart as often as may be required. Basing an opinion on a background of general knowledge, it is fairly safe to assume that this was *not* the method employed for molding the cast iron lions.

Consider Second Method

The second method deals with a solid wood pattern of the lion mounted on an open rectangular base. This method involves the use of a special flask, a plain drag and a combined cheek and cope split vertically. While the pattern rests on a flat board, one cheek is rammed full of sand and a vertical parting is made. The second cheek is rammed in a similar manner. Since no proprietary binders were available, the sand was reinforced with claywash, flour and molasses water. The two cheeks were removed laterally, finished and retouched where necessary and then dried in an oven, or by exposure to a wood, coke, or charcoal fire. The two half molds were bolted or clamped together and turned up on edge with the large opening on top. Strips of clay rolled to a thickness of ½-inch were applied to the interior face of the dried mold. At certain points the thickness of the clay was increased and the surface smoothed, to insure clearance later in closing the finished mold.

With the rectangular base pattern in place and with the drag resting on the cheeks, the interior of the mold was packed full of sand, with a generous dose of coke or cinders in the center to facilitate drying and to aid escape of gas when the core later was surrounded by molten metal. Faith may have been placed in an arbor fashioned from iron rods to hold the core in place, but more probably projecting members from the drag bars extended down to within an inch or two of the clay lining. The remainder of the drag was rammed full of sand, and then the entire assembly was

(*Continued on page* 246)

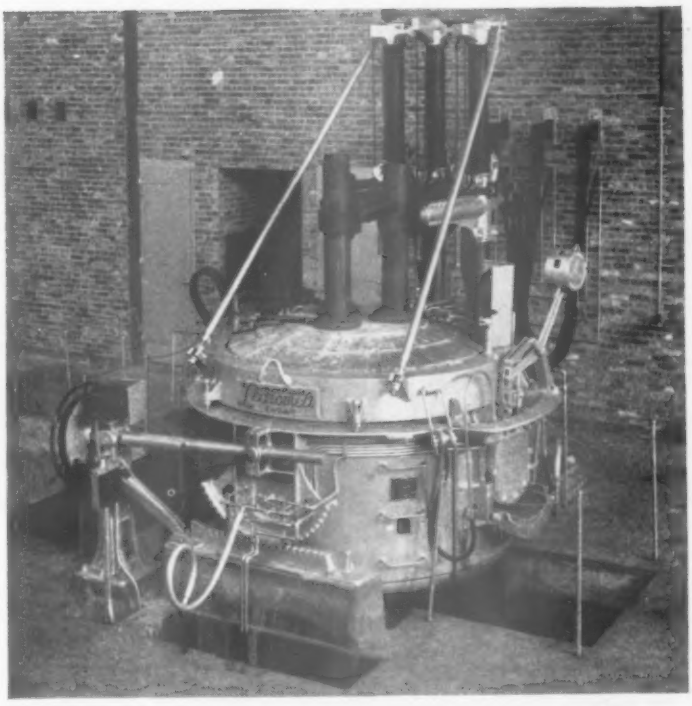
Important Announcement

ON

"IRONTON CARO-LINE"

THE MONOLITHIC REFRACTORY LINING FOR ACID ELECTRIC FURNACES AND LADLES OF ALL SIZES

Now you can have Rammed Sidewalls in your acid electric furnaces, made from a mixture of "Ironton Caro-Line" and grain sized ganister. It is quickly and easily installed with regular furnace helpers. Spalling is practically eliminated, the rammed lining is highly resistant to slags and it lasts considerably longer than ordinary silica linings. This is not an experiment—it has been used by several progressive steel foundries during the past year. Ask us for additional information on this important development.



THE IRONTON FIRE BRICK COMPANY

RELIABLE REFRACTORIES

IRONTON **OHIO**

No. 90 IRON-OXIDE

STILL GOING STRONG ON VITAL WAR ORDERS!

ORDER A SAMPLE TODAY!

Used and recommended by grey iron and steel foundries for use in their core sand mixtures because it prevents core sand failures! Prevents core burning, veining and penetration! Improves castings—reduces cleaning costs! No. 90 IRON OXIDE added to the extent of 2% by volume of sand increases high temperature strengths of core sands. Send for specifications and sample—Write Today!

No. 90 IRON OXIDE
- Solves Core Problems!
- Assures Improved Cores!
- Speeds Core Production!
- Inexpensive—economical!

Help speed the day of Victory with . . .

TAMASTONE Pattern Compound

• Speeds production as much as 400%. • Cuts costs up to 75%. • Gives micrometer accuracy on cope and drag patterns. • Converts loose and metal gated patterns into TAMASTONE match plates that are good for thousands of impressions.

TAMMS SILICA CO., 228 North La Salle St., Chicago 1, Ill.

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(*Continued from page* 244)

inverted. The cheeks again were removed laterally and set down temporarily while the molder removed the clay thickness strips from core and mold face. After the core was dried, the mold finally was reassembled and filled with metal.

The foregoing method might have been employed where only one casting was required. However, where a number of castings were on order, or where duplicate orders were to be anticipated, or where the foundryman decided to construct a number on a more or less speculative basis, as in the present instance, it is reasonable to assume that he made a cast iron shell pattern, split vertically through the center. This type of pattern was in common use at the period, and has remained in use down to the present in hollow ware foundries, and in shops that specialize in the manufacture of soil pipe fittings. Core and mold are made at the same time and the assembly is rolled over twice for removal of the pattern. The core is not disturbed. In the hollow ware and fitting shops the core is green sand. The large lion core would be dried for obvious reasons. This merely is a detail and does not affect the general description.

Sand Is Cut Away

Many large pieces of statuary have been made in sand molds by this method. The pattern, usually plaster, is adjusted for a convenient parting line and a cope and drag are rammed and separated. Hooks are bedded in small bodies of sand forming pockets and undercuts. The pattern is removed and then the mold is closed with the drag on top and packed full of sand reinforced with a special arbor made up of pieces of pipe or steel bars, bent to shape and tied together with wire. The drag is lifted off and laid down on its back. The molder cuts away a thickness of sand corresponding to the desired metal thickness, from the face of the exposed part of the core down to the parting line. The drag is replaced and the entire assembly is rolled over. The cope then is removed, while the molder removes the necessary thickness of sand from the remaining part of the core. The entire mold then is dried and afterward assembled and filled with metal. The core is supported or suspended between cope and drag by projecting members of the arbor resting on suitable supports.

As with the first, this second alternative method may be ruled out in its application to the cast iron lions. And that brings us to the third method, the method most probably employed in the old time Massillon foundry of Taylor and Clay. Incidentally, the foundry folded up and disappeared some time after the lion episode. Instances are not unknown—a familiar Baltimore example immediately comes to mind—where the luck of a firm intimately is bound to an inanimate object, but whether or not the faint superstition is a factor in the present instance is any person's guess.

In the third method, that is the meth-

(*Continued on page* 248)

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(*Continued from page 246*)

od most probably employed, a split wood master pattern was made, and mold made in the usual manner from each half. The two molds were dried to stiffen the face which then was covered with strips of clay corresponding to the thickness of metal required in the anticipated working metal pattern. A cope was rammed on this clay lined drag, lifted off and the clay was removed from the drag face. After the cope was dried the mold was assembled and filled with metal. The second half mold was treated in a similar manner. The two resulting half patterns were matched and provided with dowels.

This was the working pattern with each half mounted on a board, or with the halves mounted in proper position on both sides of a matchboard. A combined cope and cheek was rammed on each half pattern, lifted off, joined and turned up on edge. The base pattern, a plain rectangular wood frame, was adjusted in place, followed by the drag flask equipped with projecting members on the bars which extended down to about an inch from the inside face of the pattern. These bars constituted the main arbor for the core and were supplemented, where necessary, by loose rods laid in pockets in the sand. Sand was rammed inside the pattern with fine coke or cinders in the center and with a vent pipe extending vertically through the drag. This venting arrangement facilitated escape of steam while the core was in the oven, and for the escape of gas later when the core was surrounded by molten metal.

The remainder of the drag was rammed full of sand and then the entire mold was clamped and rolled over. The two cheek-copes were removed laterally, followed by the half patterns in the same manner, thus leaving the core on the drag as a unit. After the rectangular base pattern frame was removed, the mold parts were touched up where necessary and given a coat of carbon blacking and dried in the oven. Later the dried mold was assembled and filled with metal.

Presumably the jockey and negro boy figures from the collection of Mr. Clay

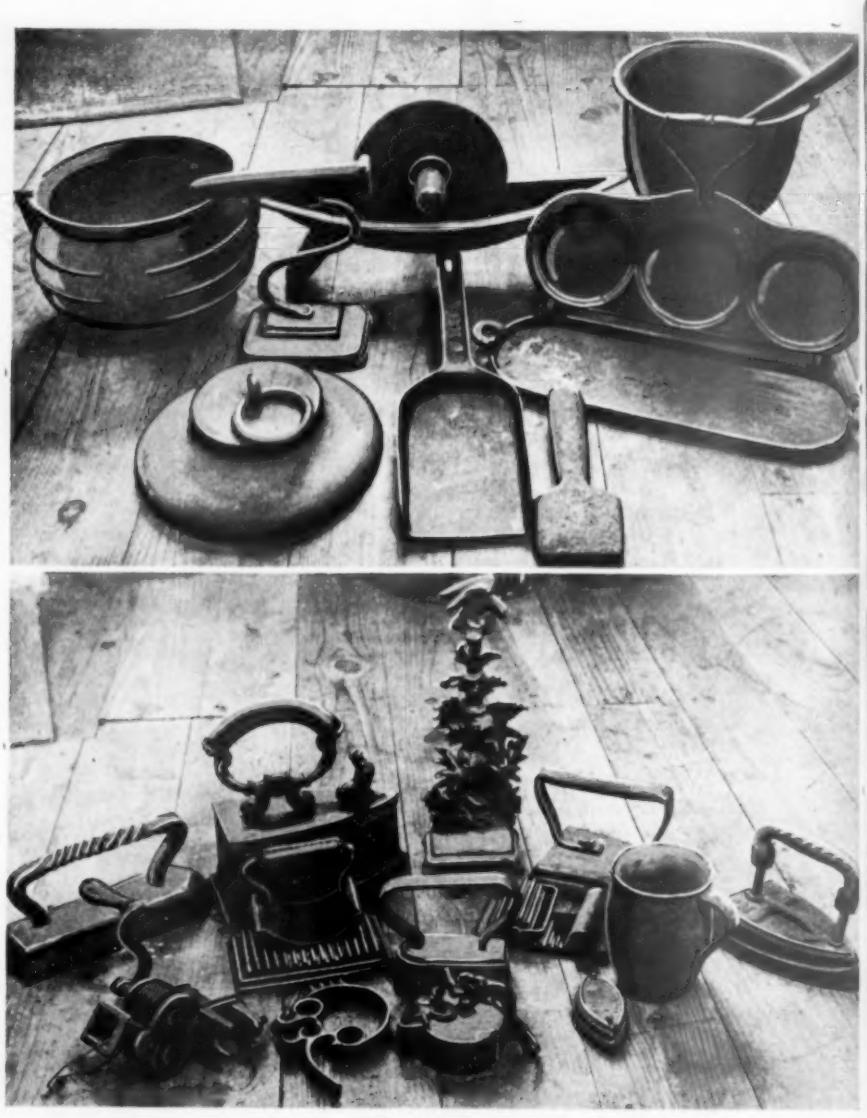

Fig. 3 (top)—The little boat and roller in the center was used for grinding corn. Fig. 4 (bottom)—Showing, among other items, a noodle cutter, two devices for crimping linen pieces of apparel and a betty lamp

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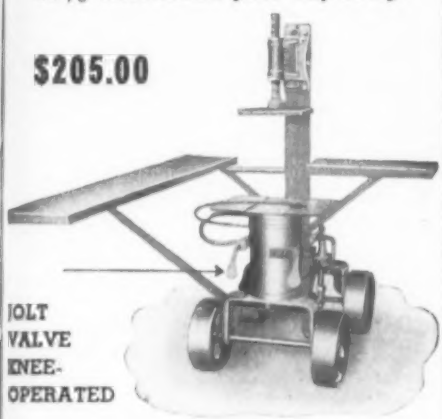

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were molded in approximately the same manner. They were picked up here and there from sources where their history and antecedents were unknown. Some of the figures seem to suggest that while the patternmaker who whacked them out of a piece of wood was a skilled mechanic, he also had a peculiar sense of humor.

A large triangular opening in the chest permitted the molder to adjust the arbor and ram sand inside the pattern. Vent from the core passed through this opening and later the sand and arbor were removed from the casting through the same doorway. When the casting was cleaned, a neatly fitting iron plate was placed in the opening and attached by a screw bolt. A coat of paint concealed the joint.

Fig. 5—The jockey in brilliant blue and white may be waiting for the last roundup

Castings shown in the other illustrations, not only reflect a high degree of foundry practice on the part of the makers, but also bring to mind habits and customs of a generation which flourished before any of the modern conveniences came into existence. For example, the cast iron pot (upper left in Fig. 3) was suspended from a crane over an open fire to cook the food. The hand wheel and boat in the center were brought from Pennsylvania in 1804. The device was employed for grinding small quantities of corn. The wheel was moved back and forth while the sloping walls of the

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container kept the contents constantly tumbling down. Other objects readily identified include a flapjack baker, a weight for tethering a horse, a coal shovel, a flat iron and a cast iron peen for a molder's rammer.

Fig. 4 shows several types of flat irons. The large box specimen, second from the left at the back, was designed to carry a small charcoal fire, a perpetual, automatic self heater, no doubt highly esteemed in its day. The display also includes an ornamental wall bracket, an ingenious device for cutting dough into noodle strips, two corrugated devices for putting crimps or ruffles on shirts and other garments; a cast iron mug, a combined stove lid lifter and steak pounder.

Fig. 6—The shoe scraper went out when paved roads came in

The object in the front center is a betty lamp dating back to the period when whale oil was extensively employed as an illuminant.

Fig. 6 shows a rather ornate example of a shoe scraper, a standard piece of equipment near the doorway of any house that pretended to any degree of style and smartness. Unpaved streets and sidewalks must have been a sore trial to meticulous housewives. The object shown is not a one piece casting. Feet and upright members are bolted to the basin. The scraper blade, well worn through long and vigorous service, is wrought iron.

REPAIR OF STEEL CASTINGS

(*Continued from page* 93)

this office provided that the procedures submitted include where applicable:

1. Nickel or monel metal rod welding: Information contained in Paragraph III B-1.

2. High and low temperature brazing and soldering:

(a) Class of casting.

(b) Method of preparation, i.e., chipping, grinding, filing, drilling, etc.

(c) Method of heating, i.e., oxyacetylene torch.

(d) Type and make of brazing or soldering material including composition.

(e) Type and make of flux.

(f) Type and degree of pre-heat in use.

(g) Method of cooling.

(h) Macrograph of a cross section of a typical repair with hardness survey showing brazing material, heat affected zone and deposit. (For brazing repairs only).

3. Plug, sleeve or bushing repair: Part number and name of casting; size, type and location of defects to be repaired, and in addition:

(a) Method of machining out defect with sketch.

(b) Materials of which plug, sleeve or bushing is made.

(c) Method of assembly, i.e., dry press fit, wrench assembly with sealer, etc.

(d) Type and make of sealer.

(e) When requested by Ordnance, a photograph of a cross-section showing a typical repair portion with the exact kind of repair.

4. For sealing repairs: Part number and name of casting, size, type and location of defect to be repaired and in addition:

(a) Type and make of sealer.

(b) Method of application with sketches and photographs and operating conditions, i.e., positions, pressure, time, etc.

(c) Method of curing, i.e., type oven, time, temperature, etc.

5. Rusting repairs: Part number, name of casting and location of defect including:

(a) Composition of rusting bath, i.e., per cent sal-ammoniac, etc.

(b) Method of application including position, pressure and time.

(c) Detailed information regarding testing method used to check acceptability of completed repair and the repaired casting.

This method will not be permitted for leakers beyond the category of seepers and weepers (where liquid comes through under test pressure at the rate of not over 2 drops per second).

V. Weld Repair Procedure Qualification Test

1. Sketches (Fig.1) represent the weld test procedure qualification plate, which plate, is to be one piece.

2. The welding scarf is to be grooved out as shown using for this purpose, tools and methods identical to those used in preparing castings for repair welding.

3. The plate shall be rigidly clamped during welding to prevent warpage to an angle of more than 5 degrees.

4. Unless otherwise specified the weld will be made in the horizontal position.

The various test specimens to be obtained from the plate are indicated in sketch.

The selection of the number and types of tests to be submitted for procedure qualification will be determined by agreement between the Ordnance Department and the contractor. The minimum requirements to be met on the preceding tests will also be determined by agreement.

VI. Matters of Information:

A. No repairs of any sort should be made for purposes of improving surface appearances.

B. After a procedure has been ap-

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proved, no repairs will be made other than those provided for in the approved casting repair procedure, except by written permission obtained from the Army Inspector of Ordnance after clearance with OCO-D.

C. The attached paper entitled "Shop Procedure for Repairing Imperfections in New Steel Castings" was prepared by the Committee on Steel Casting Repairs of the S.A.E. War Engineering Board.

The information in the attached paper may be used as a general guide as to types and extent of repairs that will be considered, in preparing requests to be submitted for approval under this bulletin.

D. The intent of this bulletin is one of clarification and *to assist* production by standardizing engineering and inspection opinions. With this in view, the co-operation of all concerned is greatly appreciated.

SHOP PROCEDURE FOR REPAIRING IMPERFECTIONS IN NEW STEEL CASTINGS

The purpose of these described procedures is manifold: To facilitate legitimate production by outlining repair practices which are approved as satisfactory from a quality viewpoint; to explain them in detail; to provide an urge toward improvement of casting quality by frank discussion of defects existing and means for repairing them; and to avoid misunderstandings as to quality levels between foundries producing castings, fabricators processing them and Armed Services procuring them as finished products.

I. Extent

The flaw must first be opened up to determine its extent. This will depend upon the nature of the defect, whether it is a shrink, blow hole, crack, machined off dimension, etc., as each sort of defect has typical extents and variations.

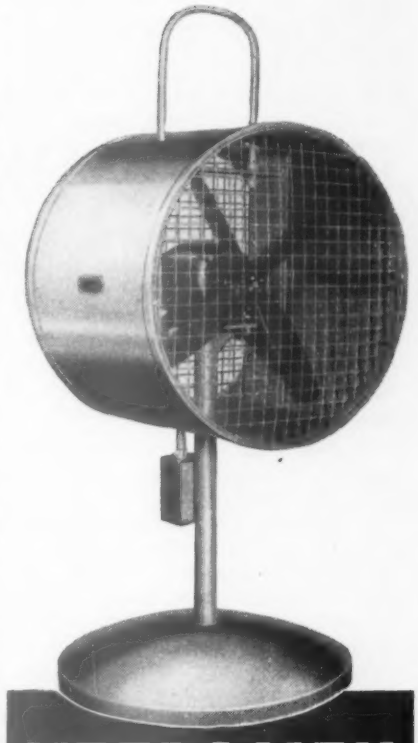
Only after opening up and/or determining the extent of the defect can it be judged as to whether or not it is repairable. The type of the defect is not important except as it governs the extent of the repair to be made after the injurious part of the defect is completely removed.

II. Preparation

The injurious part of all defects with the exception of those to be repaired by sealing or rusting must be thoroughly cleaned out before welding is started. Great care must, however, be exercised to be sure that the injurious part of the defects is all removed as chipping tends to hide the defects. The preferable procedure is to rough chip and, if necessary, complete the cleaning operation by grinding.

Sand or grit blasting may be used for mild cleaning but can not be depended upon for dirty or burned-in areas.

In some cases where cracks are to be repaired, it is advisable to drill holes beyond the ends of the cracks which can then be ground out from drilled hole to



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drilled hole. If this precaution is not taken, the cracks may propagate under welding heat.

In mild steel castings or in other specific cases after approval is obtained, the injurious part of the defect may be removed by flame gouging after preheating. Great care must be exercised when this method is applied to alloy castings.

When doubt exists that the injurious portion of the defect is removed, an approved method of inspection such as X-ray, gamma ray, magnetic particle inspection, black light and fluorescent oil inspection, acid etching test, or some other recognized method should be used.

III. Methods of Repair

A. Arc and Gas Welding.—These methods of repair are suitable for both major and minor defects.

1. Preheat.—Certain castings must be preheated prior to welding. For preheat temperatures, consult Table I. When preheating, care must be exercised not to cause undue stresses by thermal shock through sudden application of heat, as this procedure may cause cracking in certain castings.

In the case of high carbon castings, it is preferable to operate with higher minimum preheat temperatures than those indicated in Table I, as this results in decreased ultimate weld hardness. Recommended preheat temperatures for such steels would be approximately 600 F.

2. Welding.—The temperature of the casting or in the case of local pre-heat, the temperature of the area of the casting to be welded, (See Paragraph III B) should, during welding, not be allowed to drop below the temperatures given in Table I. Certain castings will require an even higher minimum temperature than this and, under some circumstances, may be desirable to apply auxiliary heat during welding in order to keep the heat in the casting up high enough to prevent damage to the casting. Stop-welding temperatures are best checked with a contact thermocouple pyrometer or a total radiation pyrometer. Temperature indicating pellets, crayons, or fusible alloy can be used to check temperatures to which castings drop.

In the case of gas welding, the procedure outlined in Paragraph III A 1 and 2 apply equally. It is recommended that a suitable flux be used which will provide adequate flotation so that the welds are sound and free of slag or gas inclusions.

3. Rod or Electrode.—Rod or electrode should preferably be of such a nature that the weld has physical and mechanical properties comparable to those of the parent metal after final heat treatment. Weld deposits in all cases should be uniformly sound metal and readily machinable.

The flux should provide adequate flotation, fluidity, or puddling, thereby facilitating freedom from slag or gas inclusions.

4. Post Heat.—Refer to Table I.

B. Welding with Local Preheat and Post Heat (Applicable to semifinished and finished castings of Low Carbon Steel).—Welding with local preheat and postheat, on semifinished or finished castings, is permissible under special conditions. When this operation is done correctly, the heat affected zones are not critical; but this type of welding should be used only where there is no danger of affecting the important areas of the castings. It should be performed only by an expert welder and then only on corners, curved areas, or on such places where expansion and contraction are not restricted.

IV. A. Nickel or Monel Metal Rod Welding.—This type of welding is suitable only for the repair of minor defects generally not deeper than 30 per cent of the section involved, and is particularly suitable for the repair of defects on machined surfaces and non-critical areas where the castings can not be given pre or post-heat.

In certain cases defects or areas larger than those described may be filled, in which cases the pre and post-heat temperatures indicated in Table I should be applied.

1. Preparation. — The methods described in Paragraph II apply. The removal of small defects may also be facilitated by drilling.

2. Preheat.—No preheat is necessary except in special cases as stated above. The casting should be allowed to come to room temperature before welding.

3. Electrode.—A rod which will produce a weld deposit of an alloy of approximately 94% nickel and 6% copper; 70% nickel and 30% copper, or approximately 50% nickel, 30% copper and 20% iron should be used. The rod should not exceed 5/32-in. diameter and may consist of a coated rod of the desired composition or a sheathed and coated rod consisting of a nickel core, a copper and a steel sheath.

4. Welding.—The method is essentially the application of a weld deposit which does not include deep puddling of the parent metal. It is performed with a standard arc welding machine (A.C. or D.C.) using as low amperage as is consistent with sound deposits and the lowest arc current which will assure proper fusion. Every effort should be used to hold down the heat in the weld area to a minimum.

5. Post Heat.—No post heating is necessary except in those cases described above where larger areas are to be welded, in which cases, the temperatures indicated in Table I apply.

6. Finish.—As soon as the weld is completed, it should be peened and dressed with a small grinding wheel or with a coarse file. Machined surfaces may be finished by grinding, filing, and polishing with emery cloth.

B. Brazing.—The methods outlined below are suitable for the repair of minor defects only and are particularly suitable for the repair of defects on partly machined or finish machined surfaces where only local pre and post heat can

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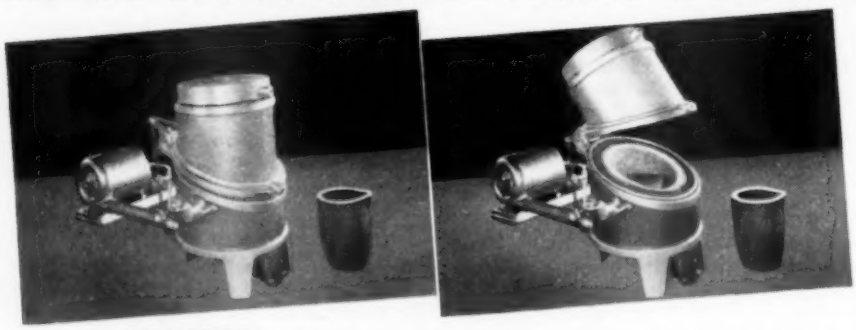

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be applied (See 1 below), or where no pre or post heat can be applied (See 2 below).

1. High Temperature Brazing Over 1300 F.—When this method is applied, the procedure is the same as outlined in paragraph III-B with the exception of the filler material. The filler material consists of tobin bronze, manganese bronze or equal.

2. Low Temperature Brazing Under 1300 F.—This method is particularly suitable for the repair of small defects which do not affect the strength or serviceability of the casting and do not require pre or post heat. The filler material consists of a hard silver brazing rod or other similar materials and should only be considered for individual cases requiring special treatment. Suppliers of these materials should be consulted for proper procedure in case of their use.

C. High Temperature Soldering. — Using the proper type of solder (such as 97.6% Zn, balance Cu, or other equivalent materials, melting point approximately 700 F) and flux, soldering is permissible for the repair of gasket faces or other small machined surfaces showing defects where structural strength or high temperature is not involved. Strong, uncut hydrochloric acid should be used for soldering flux and a soldering copper at dull red heat is the preferable method of applying the solder. Repairs of this type may be finished by filing, machining, or grinding.

(Note: Preheating to 600°F will facilitate the operation. This solder is harder than ordinary tin-lead solder and, as noted above, melts at a much higher temperature.)

D. Mechanical Repairs.—Steel plugs or bushings are permissible to repair leaky areas which are subject to compressive or low tensile stresses. They should be inserted after coating both male and female members with a litharge-glycerine sealer. Bushings should be so fitted as to be leak tight to pressure test after assembly and sealing.

E. Sealing Repairs.—Use of polymerizing resin sealers for leakers beyond the category of weepers or seepers, where the test water under pressure comes through in a fine misty spray and not in a solid stream, is satisfactory when the casting cavity is filled with liquid sealer and a pressure of at least 50 psi is applied to force the sealer into the leaks and the sealer is drained and the casting baked at sufficient temperature and time to thoroughly polymerize the sealer. Only those sealers may be used which after polymerization, resist the action of water, alcohol, anti-freeze, glycerine anti-freeze, ethylene-glycol anti-freeze, cooling system corrosion inhibitor, gasoline, lubricating oil, trichlorethylene, Stoddard solvent, kerosene, or other anti-freezes, corrosion inhibitors, or cooling system cleaners as are approved by the Procuring Services.

F. Rusting Repairs.—The use of sal-ammoniac for rusting up seepers or weepers should be done only by dissolving approximately 10% sal-ammoniac in the pressure leak test water and forcing the sal-ammoniac-water solution into the porous areas under pressure of from 65 to 100 psi. Sal-ammoniac should never be used by being placed on or in castings in high concentration and without pressure. Use of sal-ammoniac should not be permitted for leakers beyond the category of seepers or weepers (where liquid comes through under test pressure at the rate of not over two drops per second).

Whenever possible all repair welding should be carried out prior to final heat treatment. This is particularly so on castings requiring normalize, quench and temper where repair welding should follow the normalizing treatment. When it is not possible to follow the above procedure, the recommendations in Table I apply.

TABLE I—Recommended Preheat and Postheat Temperatures

Class	Chemistry[1]	Preheat Min.	Preheat Max.	Postheat Min.	Postheat Max.	Hardenability Approx. Max. J Nos.[4]
X	See QQS-681b	(5a)-None		(5b)-None		J 40-4
1	See QQS-681b	(5a)-None		(5b)-None		J 40-4
2	See QQS-681b	(5a)-None		(5b)-None		J 40-4
0	See QQS-681b	300 F	900 F	1000 F	1250 F[5]	
3	See QQS-681b	300	900	1000	1250[5]	
4A 122	See QQS-681b	300	900	1000	1250	
4B1 223	See QQS-681b	300	900	1000	1250	
4C1	See QQS-681b	300	900	1000	1250	
4C2	See QQS-681b	300	900	Re-heat Treat[3]		
4C3	See QQS-681b	300	900	Re-heat Treat		
4C4	See QQS-681b	300	900	Re-heat Treat		

[1] The chemical requirements of specification QQS-681b do not specify permissible residual elements with the exception of class I and II. In view of the effect the residual elements may have on weldability, the following maximum percentage limits, which constitute the recommendation of the Weldability Committee of the A.W.S. to the A.S.T.M., for inclusion in their revised specification, have been used in arriving at Table I: Copper 0.50, nickel 0.50, chromium plus molybdenum 0.25, tungsten 0.10. Total content of these and unspecified elements, 1.0 per cent maximum.

For each 0.1 per cent below the specified maximum alloy content of 1.0 per cent an increase of 0.02 per cent chromium plus molybdenum content and 0.06 per cent nickel and copper content above the specified maximum will be permitted.

[2] Not necessary in all cases.

[3] In all cases where re-heat treatment is recommended a re-temper will suffice when the original treatment does not include liquid quenching.

[4] For information only.

[5] The following exceptions to Table I were reported but time did not permit canvassing the entire committee for an opinion: (a) When carbon exceeds 0.30 preheat 300F. to 900F. (b) When carbon exceeds 0.30 postheat 1000F. to 1250F.

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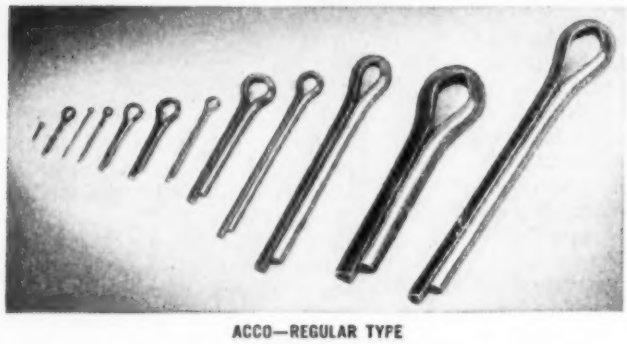

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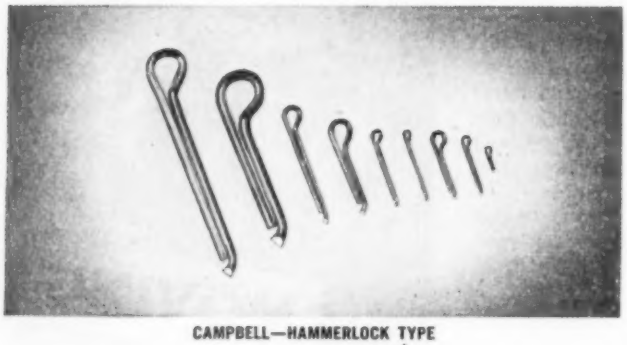

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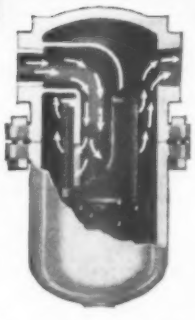

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